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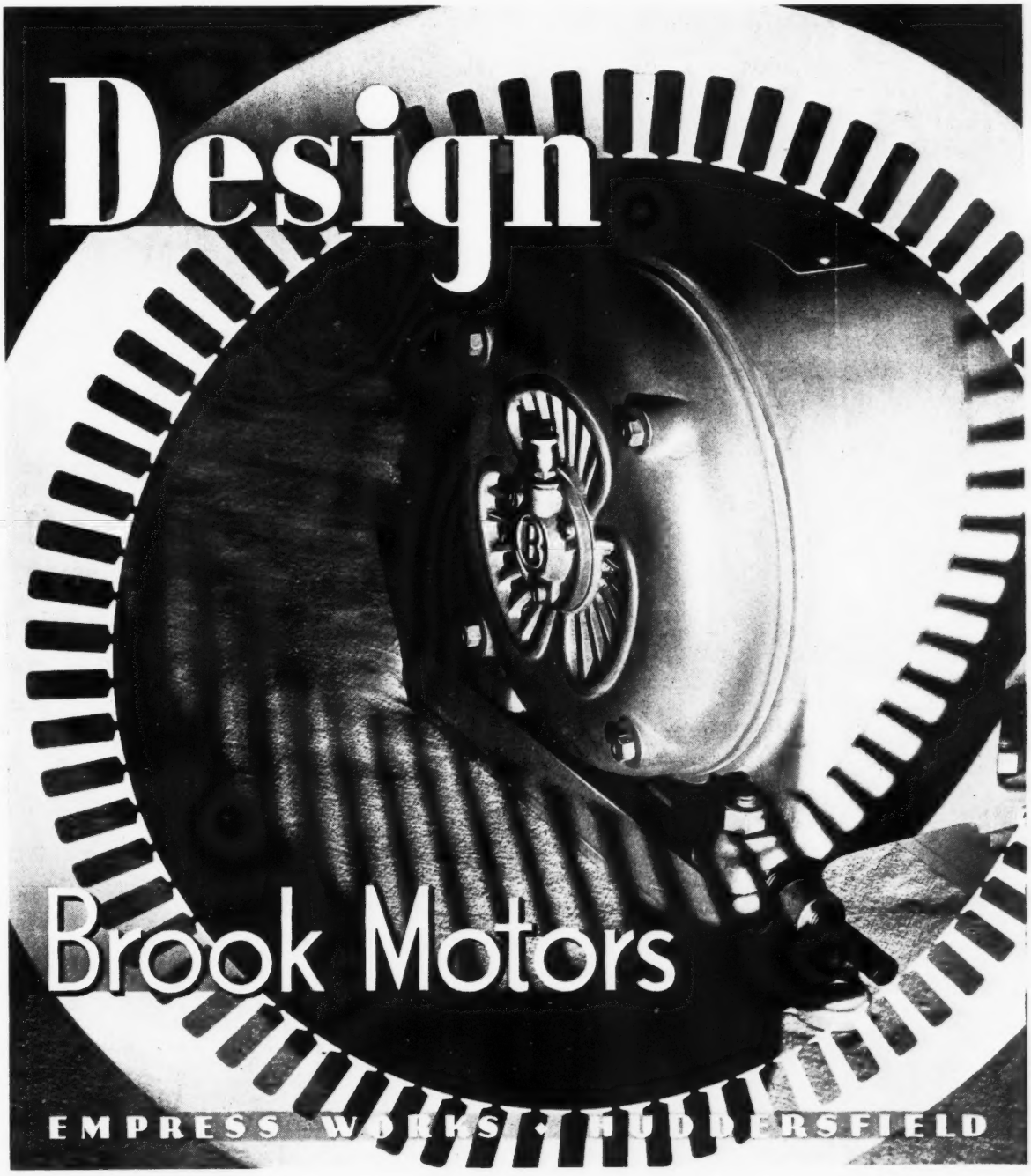

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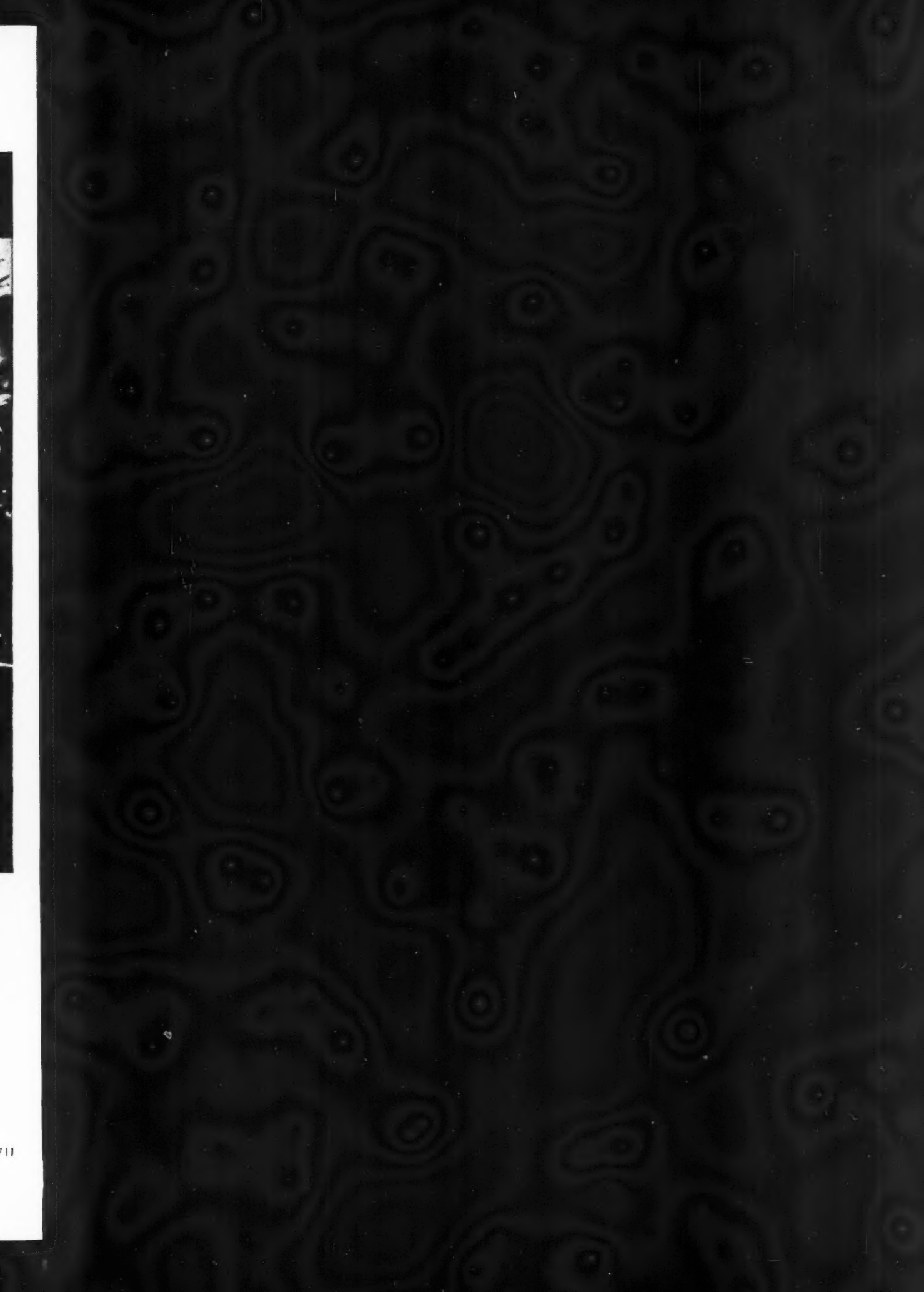

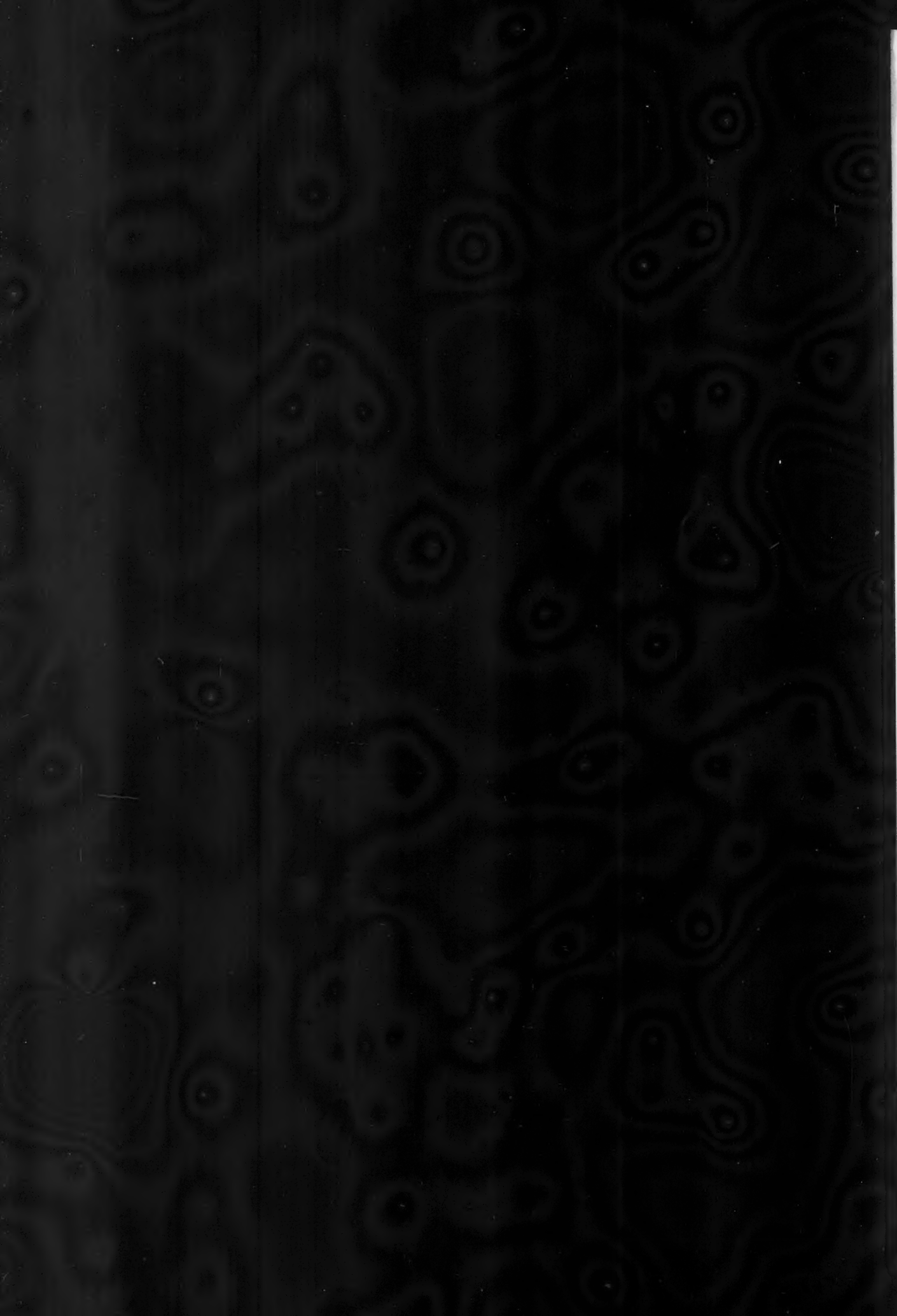

THE
ELECTRICAL REVIEW

Volume CXXVIII — No. 3316

Friday, June 13, 1941

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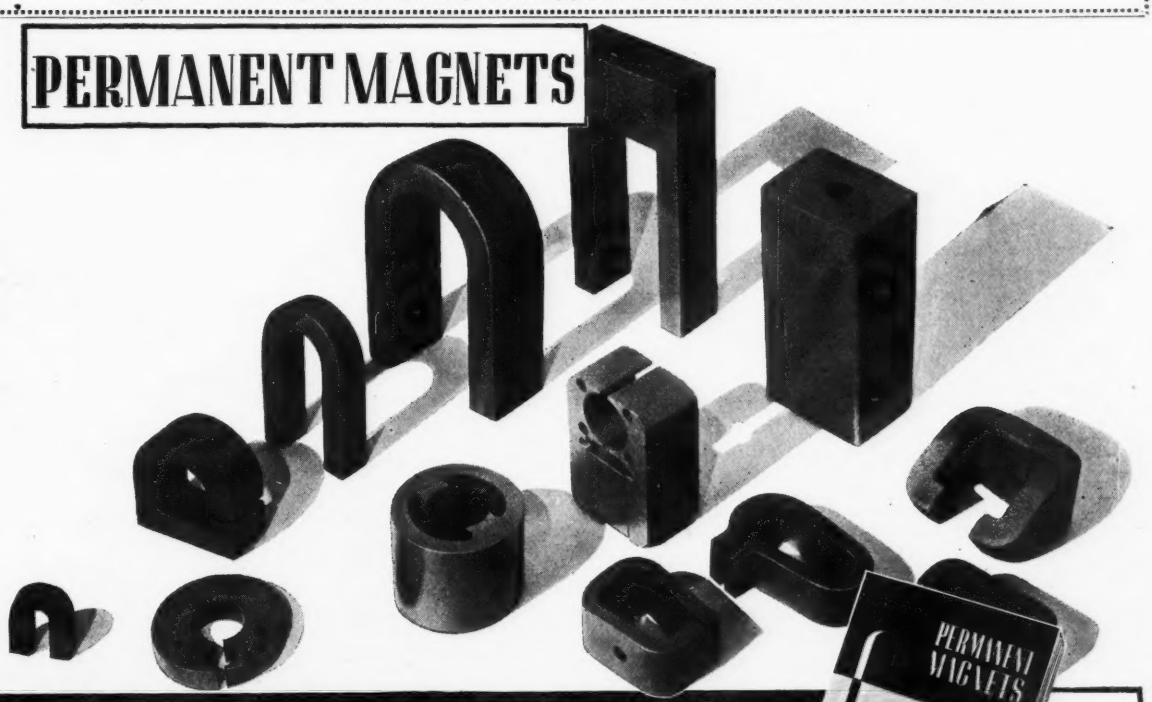

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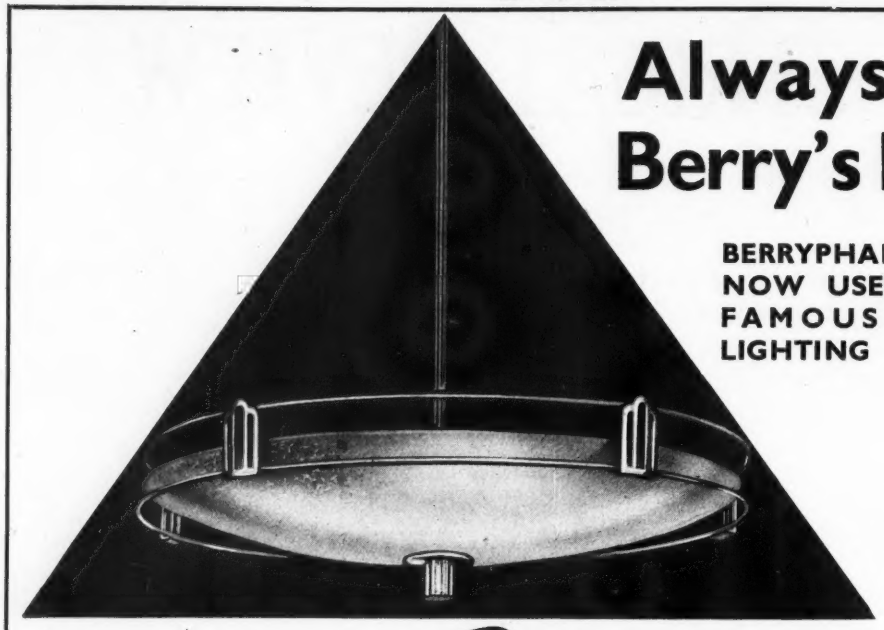

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THE
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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3316 JUNE 13, 1941 Price SIXPENCE

Communal Feeding

Growing Appreciation of Large-scale Electric Cooking

IN this issue we publish the first of two articles dealing with the position of the electrical industry in relation to the problems of equipping the kitchens of the many factory canteens, communal feeding centres and similar wartime establishments.

These articles may be considered by some readers to be overdue, but there are good reasons for this. It was obvious to us when hostilities commenced that business in domestic cooking equipment, as in the domestic field generally, would suffer heavily—how could it possibly continue to thrive under " all out " war conditions ? But we were not so sure about things in the direction of heavy-duty cooking equipment; army encampments were being built on a large scale and, even at that time, canteens were being erected as part and parcel of at least some of the factories that were to provide essential war equipment.

We remembered the hard struggle of the electrical industry during the preceding fifteen years or so which had brought electric cooking, both domestic and industrial, on to a thoroughly sound footing for vigorous and healthy commercial development just before the war, and, although we were convinced that the industry was able to give a service to the public far superior to that possible from any other medium, we were decidedly unhappy.

Diminished Production

Because of considerations arising out of the broader questions relating to the war effort, however, we remained silent, despite our consciousness of the fact that at least one other industry, quite innocently, was being placed in a somewhat favourable position with regard to cooking development in wartime, for it seemed that the electric cooker manufacturers' factories were particularly suitable for conversion for the production of urgent war materials. We were actually shown " mere corners " of modern well-equipped cooker factories which were all that was left of cooker production facilities after such conversions.

Then came the more intensive war-production programmes, leading to the Government's insistence on the establishment of suitable canteens in various war factories and, almost side by side with this development, came the call for communal feeding centres consequent on the hideous bombing of our civilian population. And all the time we were aware of the increasing establishment of Army and Royal Air Force camps and aerodromes, of supplementary hospitals, A.R.P. centres, and so on, all requiring kitchens of some sort to meet their catering necessities.

Well, the point came when, out of our increasing disturbance of mind over the whole question, we felt the urge to investigate the position thoroughly and anew, whether we remained silent or not, and then we found, to our delight, an increasing readiness in high places to look more favourably on the possibilities of soliciting the aid of the electrical industry in equipping heavy-duty kitchens. Later still we have seen the more favourable attitude grow until in some influential and official quarters the provision of electric cooking equipment is regarded as highly desirable and even, in a few similar quarters, as absolutely essential.

Post-war Prospects

War exigencies prevent us from detailing all the reasons behind this curious and somewhat striking change of attitude, but we can say that the comparative ease and speed with which damaged electricity mains can be repaired has largely influenced the question and that the overcoming of official prejudice here and there against electric cooking has also had a bearing on the matter.

Thus we see now a much better prospect in the electric heavy-duty cooking field, but we cannot agree with those people who have informed us that all is well and that the electrical industry is getting its due share. It is not. We can feel fairly satisfied from the purely wartime business aspect, but what is done now must have a considerable influence on the position after the war, when plans must be put in hand once again for a business drive worthy of so superior a public service.

Many people believe that communal feeding has come to stay, or at least that there will be a much greater tendency towards restaurant meals after the war, but whether this proves to be the case or not it is certain that the works canteen will play a much bigger part in industrial life than hitherto.

Further, as the result of the more favourable attitude towards heavy-duty cooking and of the greatly increased output of large electric cooking equipment during the war there will undoubtedly be more universal appreciation of the advantages of electric cooking in peacetime,

in both the domestic and large-scale cooking fields, which must have a decided influence on the continued and increasing business of peace-time establishments such as hotels, restaurants, canteens, etc.

Let us then go all out to give the best possible to the war effort in consequence of the favourable turn of events and at the same time keep a vigilant eye on what is being done, both commercially and technically, so that we may be sufficiently abreast of development to tackle in better days the hard work necessary to secure for the electrical industry its rightful position in the large-scale cooking business.

The Installations Section

EVER since the problems of technical interest covered by installation work were canalised in Mr. H. T. Young's presidential address to the I.E.E. in 1936, it has been felt by many electrical engineers that the ordinary general meetings do not provide enough opportunities for full discussion of the topics of this nature that ought to come within the field of the Institution's work. With regard to the latter, reference should be made to an article by Mr. S. W. Melsom, which appeared in our issue of October 20th, 1939, in which he urged the early formation of an "Installation and Utilisation Section." Arrangements have now been made to start such a Section. The title suggested by Mr. Melsom had the merit of emphasising the importance of the latter aspect and in the shorter name "Installations Section" adopted by the Council, the significance of the final "s" should be borne in mind.

Up and Up

THE increase of 10d. per ton in the price of coal which came into operation last week, with a threat of a further rise in a month's time, does not improve the outlook for electricity supply undertakings. And as the extra cost of coal to the railways will strengthen their case for higher freight charges there is the added possibility of a bit more per ton on this account. The Manchester Electricity Committee pointed out recently that during the year ended March 31st last, there had been an average increase of 2s. 11d. per ton in the price of the coal purchased. It may be true to say, as the Secretary for Mines did a short time ago, that the effect of these extra costs on the price per unit is small, but they add to the burdens which are being thrust on supply undertakings from all directions and must have their effect in increasing production costs. It looks as though the Chancellor of the Exchequer will soon have to implement his promise to take steps to prevent a further rise in the price of electricity.

Coal Supplies

THERE appear to be grave misgivings in a number of districts in connection with coal stocks. In some instances it is thought that unless active steps are taken immediately there is a danger of a shortage of power during the coming winter. Maybe the winter seems far off to the responsible authorities, but actually there is little time to improve the present state of affairs and thus guard against a contingency which would have very serious effects upon both industry and the public.

Cleaner Air

No scheme of reconstruction will be in any way satisfactory that does not aim at reducing to the minimum the pollution of the atmosphere in the interests of health and civic amenities generally. In an Interim Memorandum submitted to the Minister of Works and Buildings, the National Smoke Abatement Society urges that the use of smoke-producing fuel should be prohibited for all new commercial premises. For the rest, the constitution of smokeless central areas in cities is advocated on the lines of the findings of the committee appointed by Manchester Corporation before the war. There should be no difficulty in requiring all new housing estates and new flats to comply with civilised standards. For curbing the chief offender in most areas—the domestic hearth—the encouragement of electrification again provides the means. There is no doubt, also, that the smoke evil due to industry can be very considerably mitigated by the use of power from electric power stations where fuel is burned under skilled supervision. Unlike most reforms, smoke elimination entails no deterrent expense in the long run, since it is largely a product of inefficiency and its ravages are costly to repair.

Another Fish Story

OF the many ways of catching trout, an American method reported in an evening paper is surely the furthest removed from "the calm, quiet, innocent recreation" which Izaak Walton recommended to all that are lovers of virtue. A metal-wire screen attached to cork floats is stretched across the stream and trawled up and down by two men wearing rubber gloves and boots. A third hand retrieves the catch (if any). The screen is electrified by current supplied from a petrol-driven generator, the other pole of which is earthed to an electrode driven into the river bed near the bank. Although the electrical efficiency would appear to be very low, this method of securing a fish diet is probably less expensive overall than the more orthodox one in which fishing is regarded as a sport. But there is a more serious objection to it. When the Compleat Angler suggested that the votaries of the piscatorial art should "angle on and beg to have a quiet passage to the grave" it is to be supposed that he had in mind the efflux of the normal span of life, not that he was inspired to prophesy how a quicker path might be followed in a more violent age.

Unsuitable Appliances

AN attempt is being made in Birmingham to prevent the connection to the mains of appliances likely to be troublesome, if not dangerous, to the users. The Mains and Commercial Department of the Corporation electricity undertaking recently suggested that all members of the local branch of the Electrical Contractors' Association should give notification of all equipment which it was proposed to add to existing installations, as, it was stated, consumers and their contractors had been put to considerable trouble and expense in cases where unsuitable appliances had been installed. We would imagine that reputable contractors, such as members of the E.C.A., would not be parties to the installation of unsuitable appliances, and probably the Birmingham branch felt a little hurt when, at a recent meeting, "the request was noted."

Swiss Electrical Industry

SWITZERLAND is in a most peculiar position as the only neutral country remaining in Central Europe—a country which depended largely upon export trade to keep going. Some light is thrown upon its present situation by a recent article in "Swiss Technics," published by the Office for the Development of Trade. This refers to the difficulties of obtaining raw material, which practically all has to be imported, and the transport problems, but says nothing about the means of overcoming these obstacles. And yet the article shows that one leading firm of electrical manufacturers is still producing plant for overseas customers. It mentions a large motor for Norway, transformers for Ireland, Sweden and Bulgaria, and alternators for Brazil and Indo-China. It was reported from Geneva last week that a new trade agreement with Italy confirmed the latter's assurance that Swiss goods for export would find means of transit through Italy and especially through Genoa.

Wartime Kitchens

A Favourable Turn of Events

Heavy-duty electric cooking is making headway against older methods owing to its advantages in present-day circumstances

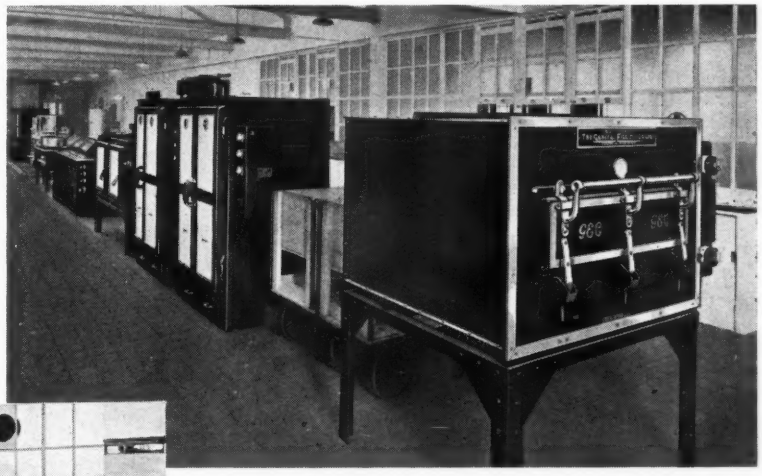
WHEN we decided a few months ago to investigate afresh the position of the electrical industry in wartime feeding arrangements—works canteens, communal restaurants, etc.—we were doubtful whether it was getting its fair share of the business owing to certain wartime exigencies which had not been favourable to the continuation of the production of electric cooking equipment, but we were glad to detect a change of outlook more promising to the electrical industry as the result of the changing war conditions.

We consider that recent developments in the heavy-duty cooking field, if properly handled, are likely to have a considerable influence upon the after-war position of the industry, and there is room for more demonstration installations. It must be remembered that immediately before the war heavy-duty electric cooking had only just emerged from the long and difficult period of research and prejudice, but it was ready for a really sound commercial drive.

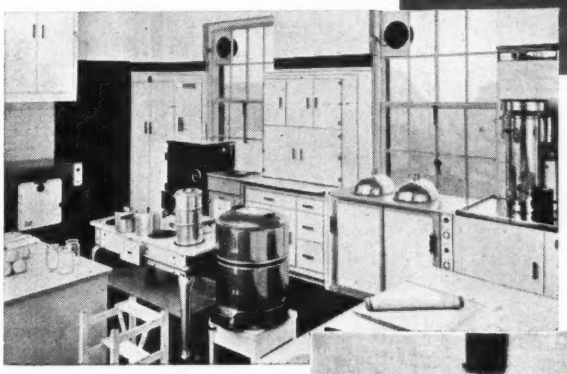
Generally it may now be said that the electrical industry is fairly well represented in the supply of wartime kitchen equipment, and manufacturers have told us that they have as much business on hand as they can manage. That in itself may perhaps be reasonably satisfactory from the purely wartime aspect, but the electrical industry is still looked upon as a newcomer into the cooking field, and although it offers a superior commodity, it has to compete with older and well-established industries. While this is so we cannot be wholly satisfied.

There are certain wartime circumstances peculiarly favourable to the electrical industry, but we strongly urge all concerned to rely mainly on the fact that electricity offers superior cooking service to the public. That is the point which will tell in the long run. Service, economy, fitness for purpose, continuity, precision of control, reliability, cleanliness and above all, better "heat-treatment" are all points in favour of electric cooking which we have pressed and will continue to press.

Where war conditions are helpful, of course, we should take full advantage of them, and in saying this we are thinking particularly of the old difficulty of overcoming the prejudice of the professional chef. Wartime kitchens are largely staffed by a new school of cooks—mostly women who, experience has shown, are more willing to give the modern method a fair trial. We should look to these to give electricity the chance which has so long been denied it and see that they receive all possible assistance and advice.

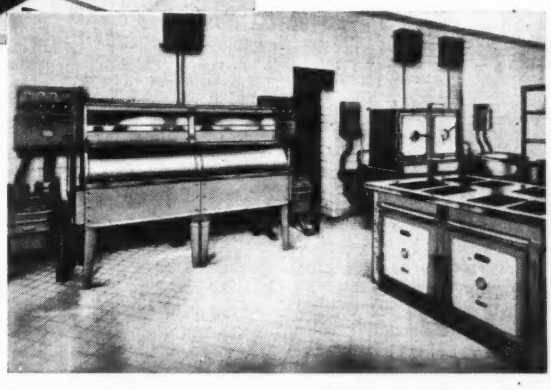


This canteen kitchen for 1,500 people was laid out by the same designer as the 250-people installation on page 729



There is scope for more demonstration installations; the above is one established by a supply undertaking

What are to-day's principal development grounds in the heavy-duty cooking field? As we see it the whole problem may be considered under two main headings—canteen and community feeding installations. The significance of the former has risen from the Order of the Minister of Labour requiring all factories with 250 workers or more to establish canteens where employees can obtain regular meals at low cost and recommending the grouping of smaller factories for the purpose of establishing canteens. For some time now the tendency has been to install more and more electric cooking equipment in such canteens, and in many instances the official attitude seems to have changed completely within the last few months—weeks perhaps.

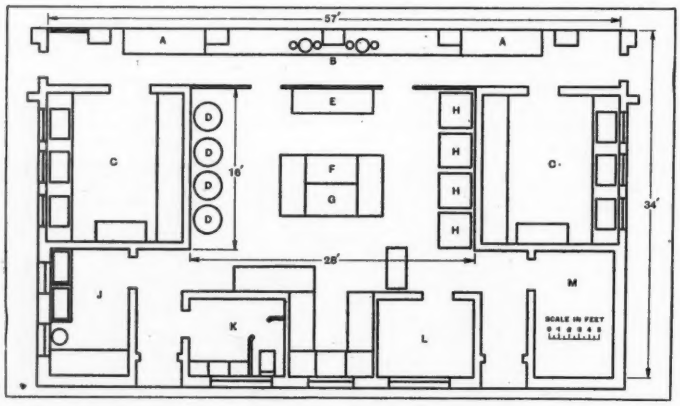


About 400 full meals at mid-day and 80 at night are served by this electrical works canteen

In connection with community feeding the electrical industry has recently experienced similar encouragement which has now been brought to a head by the scheme of the Ministry of Food to establish a pool of kitchen equipment from which municipalities wishing to set up "British Restaurants" can draw and receive financial facilities for doing so. Briefly the ten items of the pool equipment are electric potato-peeling

machines, two-pan gas-fired fat fryers (fish and/or chips), 20- and 30-gallon coal-fired boilers, 30- and 40-gallon gas-fired boilers, coal-fired ranges, two-oven electric ranges, electric steaming ovens, electric roasting or cabinet ovens, electric mixing machines and gas-heated café sets. The coal-fired equipments are intended purely as a standby, so that omitting these and the food-preparation machines it will be seen that of the six remaining equipments the three most important ones from the general cooking aspect are electrical, which is not too bad. All the same we are a little disappointed that electric boiling equipment is not represented, because it is particularly efficient and economical, and because under prevailing conditions the chances of getting public-utility supplies restored quickly are very much on the side of electricity.

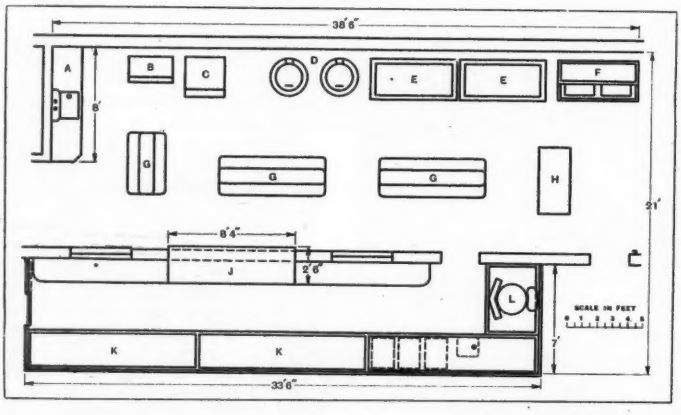
Shelter feeding, mobile canteens, Army and R.A.F. canteens and ships' requirements are other development fields for heavy-duty cooking equipment, and even in the intense war atmosphere we must still keep an eye on hotels and restaurants—not forgetting snack bars—to which we must look for business after the war.



A—Hot cupboards and bain maries; B—Café sets; C—Preparation space; D—Boiling pans; E—Hot cupboard and carving table; F—Range; G—Double steaming oven; H—Double roasting ovens; J—Preparation space; K—Offices; L—Store; M—Refrigeration.

What about kitchen space? The communal kitchen (above) and the works canteen kitchen (below) were designed by the same man

A—Sink; B—Griller; C—Steaming oven; D—Boiling pans; E—Ranges; F—Fish fryers; G—Preparation tables; H—Hot cupboard and bain marie; J—Service hot cupboard; K—Service counter; L—Water boiler.



To-day's Cooking Methods

It is first necessary to find out what classes of cooking are called for within the field under discussion and to do this we think it is necessary to couple bulk and emergency feeding with most of the uses we have mentioned, but particularly with community feeding centres, remembering that British Restaurants, for instance, are designed to serve under both "normal" wartime and emergency conditions.

For quick service to large numbers of people there is, of course, nothing to touch boiling. The cooking is simpler, keeping the food hot is easier and service is speedier.

Community feeding kitchens, then, should be well equipped for food boiling; but we suppose that any of the types of installations we have under consideration are to-day likely to have to meet emergency conditions. Soup and vegetable boilers have been well tried and proved, but we have been a little disappointed in our investigation not to have heard more about the stockpot—it seems to us to be such an obvious necessity in meeting emergency demands. An outstanding difficulty in connection with the production of boiling equipment is that of obtaining copper for the food containers, but this problem has been successfully solved by deep tinning and enamelling.

Water boiling must be considered under the heading of cooking and in this connection we should not forget the success of the common wash-boiler at such functions as agricultural shows in peacetime. The hot drink is perhaps the first essential in connection with emergency feeding and in this matter shelter feeding and mobile canteens should receive special consideration. The automatic water boiler is an outstanding success, and we recommend special attention to those excellent combined equipments which provide both boiling water and hot tea, coffee and milk; boiling water for tea in bulk and for independent pots; rush-hour rapid draw-off and constant delivery rates. Keeping cooked food hot is a special necessity for bulk feeding, and what better equipment is there for this purpose than the well tried automatically controlled low-loaded hot cupboard?

We are greatly disappointed at the poor outlook to-day for the fish fryer consequent upon the difficulty of obtaining cooking fats. Earlier in the war, however, the outlook was poor for any kind of electric heavy-duty cooking, but sheer necessity has cleared the way for it. Fish and chip frying is an excellent means of bulk feeding.

Apart from emergency requirements, catering in the canteen is a more varied undertaking and much more roasting is done, so that the installation requirements in the way of equipment do not differ greatly from those of the hotel or restaurant, except, of course, that there is no call for other than plain and essential foods. However, boiling equipment is still first on the list in this field. Then come steaming and roasting ovens. The steaming equipment with its immersion or clamped heater is as highly efficient as the electric kettle and is well proved for bulk feeding.

Electric steaming equipment must not be confused with normal steam cooking which, combined with electric cooking, is often justified, particularly under to-day's conditions with steam as a standby, but also where the existence of process steam makes it economical. Roasting and baking ovens have had their particular fields of development in heavy-duty cooking, but at present there is an increasing amount of overlapping because of the necessity of simplifying installations. With the domestic cooker the housewife not only does every kind of baking, including pastry, but also all classes of boiling.

Whether roasting ovens and boiling tables (hot-plates) should be separate or combined is a problem of kitchen planning and compromise is often advisable. Grilling can be an excellent means of providing quick service and as toasting is similar we suggest dual-purpose equipment to achieve simplification.

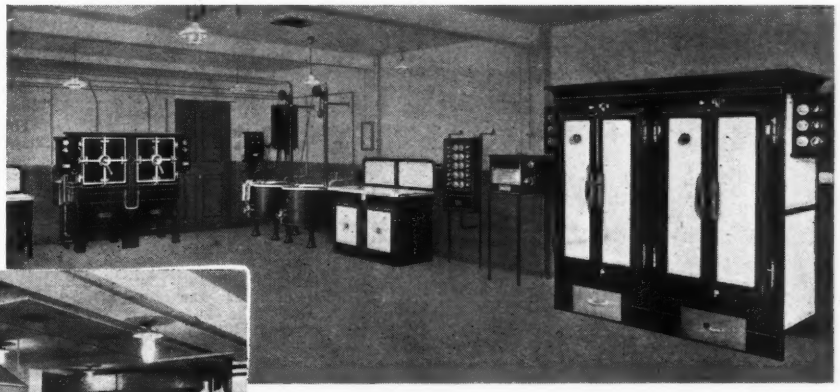
Kitchen Planning

There is no precise relationship between the sizes of equipment necessary and the number of people served, because of so many variants, not the least of which is the ingenuity and methods of the cook. Experience has produced some useful guidance, however, and generally there are greater opportunities for actual cooking-space economy in the larger equipment. A canteen range for a thousand

people is not double the size of one for 500 people, although the latter range should be about double the size of a 250-person range; catering for 1,500 people necessitates about 124 cu. ft. of roasting space. Then there is a wide "flexibility of operation" factor, the increase of which may or may not be permissible according to the conditions of the moment. There is very little difference between the total equipment capacity required for 150-person and 250-person canteens; the 500-person installation is about the same as that for 250 people, while in the 1,000-person installation certain items only have to be increased in size.

It is interesting to compare installations for 1,500 people and 250 people designed by the same individual. The former installation consists of a six-oven range (90 kW); two roasting ovens (16 kW); one boiling table (20 kW); six steaming ovens (54 kW); three boiling pans (54 kW); two stockpots (7.5 kW); an eight-pan fish fryer (100 kW); 100 ft. of service counter (70 kW); and 750 pints per hour of water-boiling equipment (40 kW).

The installation designed for 250 people comprises a double-oven range (30 kW); a two-pan fish fryer (14 kW); a steaming oven (9 kW); a boiling pan (6.25 kW); 12 ft. of service counter (12 kW); and 125 pints per hour of water-boiling equipment with a loading of 7.5 kW.



This canteen kitchen for 250 people affords an interesting comparison with the 1,500-people one illustrated on page 727

What about kitchen space? We repeat our peacetime assertion that with good planning and operation electrical equipment will provide more cooked food for a given floor space than any form of fuel-fired equipment. Recently we have seen odd corners of factory buildings being cleared ready for canteen kitchens, obviously, to our mind, giving inadequate space to the people to be catered for. Will cases like these later on result in duplication of expenditure when it is found by experience that the kitchens are not large enough?

It is seldom possible to discover ideal premises under present conditions, and there must, of course, be compromise on this point; all the same there must also be a limit to the amount of equipment installed in a given space and we recommend works managers and others interested to apply the continuous-flow production principle of the factory to the canteen kitchen, and to work in close co-operation with the equipment manufacturers on this point. A useful guiding figure is a minimum of 3 to 4 sq. ft. of kitchen space per person.

In the canteen of an electrical manufacturer 400 meals are served at mid-day and about 80 at night, as well as from 50 to 100 egg or fish "high teas." In addition about 28 gallons of tea are sent round the works in the morning and about half that quantity in the afternoon. The equipment consists of a large griller-toaster (9½ kW); a two-pan fish fryer (48 kW); two vegetable and pudding steamers (15 kW); two vegetable boilers (24 kW); a serving table hot cupboard (10.75 kW); two smaller hot cupboards (13 kW); a fish and chips warming oven (3 kW); four main cooking ranges (72 kW); and a water boiler (9.2 kW).

The following works canteen and communal feeding centre kitchens afford an interesting comparison in that they were designed by the same man. The canteen installation provides from 300 to 400 meals at one sitting and consists of two double-oven cookers (60 kW); one two-pan fish fryer (18 kW); two 20-gallon boiling pans; one 7 cu. ft. steaming oven; one 3 sq. ft. griller-toaster; 45 cu. ft. of hot cupboard space; and water-boiling equipment of 180 pints capacity.

In kitchen planning works managements should work in close co-operation with the equipment manufacturers; a well-laid-out installation

The communal feeding centre installation is for 750 to 1,000 people and consists of four 15 cu. ft. roasting ovens; 60 cu. ft. of hot cupboard space; two water-boiler sets with 400 pints draw-off capacity; six 30-gallon vegetable boiling pans; 14 cu. ft. of steaming oven capacity; and a 28-kW double-oven cooker.

In a subsequent article we propose to go into more detail in the matter of heavy-duty cooking equipment.

Nutrition and Communal Feeding

A NUMBER of useful hints relating to nutrition and communal feeding was given on May 29th at a special afternoon conference arranged for the Electrical Association for Women's teachers' and demonstrators' circles at the E.A.W. headquarters in London. Speaking on the nutritional aspect of communal feeding, Professor V. H. Mottram, Professor of Physiology at the University of London, emphasised the importance of securing an adequate supply of protective foods in the diet and pointed out fallacies regarding the vitamin content of various foodstuffs.

From her experience as Meals Superintendent of West Ham, Miss Margaret Anderson dealt with a number of aspects connected with the planning of communal feeding centres. She praised the local electricity undertaking for its service in providing and installing at short notice large size cookers and wash boilers and also for rapidly restoring supplies in feeding centres that were bombed. The E.A.W.'s all-electric and trailer canteens had proved most useful: the latter was engaged in shelter feeding while the former was serving daily between 250 and 300 hot meals a day.

In establishing feeding centres Miss Anderson stressed the importance of choosing suitable sites and in securing amicable co-operation between different departments. Ground floors should be selected wherever possible and attention should be paid to providing good lighting for the staff to work by.

The Ministry of Food had built up pools of kitchen equipment which was obtainable through the local authority. This apparatus was usually of the large type. For cooking vegetables and soups there was nothing more efficient than the electric wash boiler. The work involved at the centres demanded a specialised training for the staff and she was hoping that before long special courses for them would be provided, together with small Government grants for the purpose. Thanks to the two speakers were expressed by the Dowager Lady Swaythling, President of the E.A.W.

PERSONAL and SOCIAL

News of Men and Women of the Industry

ONE of the best-known men in the electrical industry has just celebrated the jubilee of his connection with one of the oldest concerns in the industry. He is **Mr. B. C. Evans,** of Veritys, Ltd., who during the past fifty years has taken an active part in every movement which has had for its object the welfare and advancement of the electrical industry. He has been particularly active in connection with B.E.A.M.A. affairs and the Dynamo and Motor Makers' Agreement. He has been a Companion of the Institution of Electrical Engineers since 1929.

Mr. B. C. Evans

To commemorate the jubilee and to show their appreciation of and affection for Mr. Evans, his senior colleagues at Veritys arranged a luncheon in Birmingham yesterday (Thursday) at which he was to be presented with an inscribed gold watch and chain.

Following the death of the Mayor of Blackburn, **Councillor E. Porter,** J.P. (Deputy Mayor) has been appointed his successor. Mr. Porter is chairman of the National Joint Industrial Council for the Electric Cable Making Industry.

The Secretary of State for Air and the Minister of Aircraft Production announce that **Sir Henry Tizard,** Rector, Imperial College of Science, has been appointed an additional member of the Air Council. In this capacity, and as a member of the Aircraft Supply Council he will have special responsibility for studying and advising on scientific and technical policy. **Air Vice-Marshal F. J. Linnell** has been appointed a member of the Aircraft Supply Council in executive charge of research and development. He will be promoted to the acting rank of air marshal and will become an additional member of the Air Council. The responsibilities of **Sir Frank Smith** as the executive head of the Department of the Ministry of Aircraft Production which deals with telecommunication equipment, are unaffected by these appointments.

Mr. M. C. Henderson has been elected president of the New Zealand Institution of Engineers and **Mr. J. G. Lancaster** vice-president.

Mr. A. F. Lee-Smith, A.M.N.Z.I.E., has been appointed engineer to the South Canterbury Electric Power Board, New Zealand. Mr. Lee-Smith, who was formerly assistant engineer to the North Canterbury E.P.B., was employed by the Waitaki E.P.B. and later joined the staff of the North Canterbury Board at its inception in 1928, as an assistant to Templin & Toogood, who were at that time consulting engineers to the Board. A year later he was appointed assistant engineer to the Board.

Mr. W. Easton, B.Sc., A.M.I.E.E., whose appointment as deputy electrical engineer and manager to the Burgh of Falkirk was announced in our last issue, is on the engineering staff of Central London Electricity, Ltd. He was indentured to the late Mr. Frank Robinson, manager of the Galashiels & District Electric Supply Co., Ltd., and received his technical education at Edinburgh University. He was subsequently on the staffs of Edinburgh Corporation Electricity Department, the North Eastern Electric Supply Co., and Manchester Corporation Electricity Department before joining Central London Electricity, Ltd. He has been closely associated with development work in the supply industry and has been a regular contributor to the technical Press on commercial development matters.

Mr. F. Evans, who as we reported in our last issue, has been appointed commercial manager to the Bradford Corporation Electricity Department, is accountant with the Stepney Borough Council electricity undertaking. He entered the service of the Plymouth Corporation in 1912, and except for service with the Forces in the last war, remained there until 1937 when he went to Stepney, where he introduced a system of complete financial control within the electricity undertaking. Mr. Evans is an associate member of the Society of Incorporated Accountants and Auditors.

Manchester Corporation Electricity Committee has expressed appreciation of the services of **Mr. P. T. Fowler,** high voltage mains engineer, who has retired under the age limit.

At the annual meeting of the Ayrshire Electricity Board held at Kilmarnock **ex-Bailie Thomas Murray,** Ayr, was unanimously re-appointed chairman.

Miss Lilian Robinson, a senior demonstrator in cooking and housecraft with the North-Eastern Electric Supply Co., Ltd., retires from the company's service at the end of June.

Miss Robinson entered the "Nesco" service some years ago under the style "lady visitor" and was one of the first demonstrators in the industry.

Mr. G. H. Ince, C.B., has been appointed by the Minister of Labour and National Service to fill the new post of Director-General of Man-power, with effect from June 9th. Mr. Ince will take charge of the National Service, Labour Supply and Military Recruiting Departments of the Ministry. **Sir William Beveridge,** K.C.B., will relinquish the charge of the National Service and Military Recruiting Departments and will act as chairman of a committee, which will also include **Sir Charles Craven** and **Mr. J. C. Little,** to examine, in consultation with the three service Departments, the employment of skilled men in the forces.

Mr. W. J. Guscott, who has been connected with the Dawlish Electric Light & Power Co., Ltd., since 1928, and for eleven years has been district manager, has been appointed assistant manager of the Teignmouth Electric Lighting Co., Ltd., and Dawlish Electric Light & Power Co., Ltd., which are under common management. Mr. Guscott will remain resident in Dawlish. **Mr. L. Amess,** assistant district manager of the Dawlish Co. since January, has been appointed district manager in succession to Mr. Guscott.

Mr. F. H. Corson, city electrical engineer, Gloucester, who is due to retire on reaching the age limit in September, has consented to continue in his position for the time being.

At the annual general meeting of the Institute of Physics held on June 4th, the following were elected to take office on October 1st, 1941:—President: **Professor Sir Lawrence Bragg.** Vice-President: **Professor W. Makower.** Hon. Treasurer: **Major C. E. S. Phillips.** Hon. Secretary: **Professor J. A. Crowther.** Ordinary members of the board: **Professor J. Chadwick** and **Mr. D. C. Gall.**

The four assistant general managers of the Shawinigan Water & Power Co. have been appointed vice-presidents. They are **Mr. R. J. Beaumont** (in charge of distribution), **Dr. J. B. Challies** (executive engineer), **Mr. P. S. Gregory** (in charge of sales and promotion) and **Mr. J. Morse** (in charge of operation). Dr. Challies was formerly in Government service and joined the company in 1924. He represented the Dominion Government at the World Water Power Conference held in London in 1924. Mr. Beaumont is of English birth and entered the company's service in 1910.

Obituary

Mr. Charles Davies, of Manchester, whose recent death has occurred at the age of seventy-seven years, was for many years in business as an electrical contractor at Manchester, and was founder and for some years managing director of C. Davies & Co. He had been chairman of the Urmston Urban District Council.

Mr. George John Wade, of Bromley, Kent, whose death has occurred at the age of seventy-six years, was in business as G. J. Wade & Son, electrical engineers, Bromley.

Electromagnetic Theory

THE considerable output of books on theoretical and experimental physics is a tribute to the tremendous advances which have been and still are being made in this important branch of science. It is even more striking that relatively there is so little overlapping of treatment in the books written on the various domains of modern physics. This, it may be conceded, is due to the widely spreading ramifications of the subject and the different methods of approach to its study which are possible. The ever greater intermingling of physics, mathematics and technology in their various pure and applied aspects adds to the latitude which may be permitted without writing the subject to death or running the risk of an accusation of plagiarism.

A new book, by an associate professor of physics at the Massachusetts Institute of Technology (Electromagnetic Theory. By Julius Adams Stratton. Pp. 615, Figs. 116. McGraw-Hill Publishing Co., Ltd. Price 42s. net), provides a good example of what we have in mind. Contemporaneous with this one, another book on electromagnetic theory studies the subject from the relativistic angle, its authors deeming this the only logical approach. Prof. Stratton, on the other hand, employs the Maxwellian method with equally conspicuous success, asserting that "whatever forms the equations of quantum electrodynamics ultimately assume their statistical average over large numbers of atoms must lead to Maxwell's equations." The one includes phases of atomic physics, while the other deals only with large-scale phenomena. The approaches to the subject are by different paths which in the end, however, achieve precisely the same object.

Prof. Stratton's book represents an attempt to provide a more adequate treatment of variable electromagnetic fields and the theory of wave propagation than has been done before in the hopes that it will supply the fundamental background necessary for a critical appreciation of original contributions in special fields. The first and second chapters of the book are of a general nature dealing with the equations of fields and potentials and the fundamental stress and energy properties of fields. Chapters three and four relate to stationary electrostatic and magnetostatic fields, treating these as particular cases of dynamic field equations.

The propagation of homogeneous plane waves in unbounded isotropic media is dealt with in chapter five. Chapters six and seven are concerned with the propagation of cylindrical and spherical waves in unbounded spaces, the studies being facilitated by the application of Bessel functions, spherical harmonics, and vector solutions of the waves equation. Various aspects of the general theory of wave radiation are discussed in chapter eight, whilst chapter nine surveys a number of boundary-value problems associated with the effect of plane, cylindrical, and spherical surfaces on the propagation of electromagnetic fields. A set of problems, provided with answers or references, accompanies most of the chapters.

The book is largely mathematical in conception, being of the kind suited chiefly to advanced theoretical physics students, and to research workers. It belongs to the publishers' International Series in Physics and more than worthily upholds the high standard set by its predecessors in the series. To those needing a modern text on the subject we recommend this book with every confidence in its usefulness.—S. A. S.

I.M.E.A. Activities

Annual Report submitted at Yesterday's Meeting

MR. J. W. J. Townley (West Ham) is to be the new president of the Incorporated Municipal Electrical Association, with Mr. F. Newey (Lincoln), as vice-president. These elections are announced in the forty-sixth annual report of the Council, submitted at the ordinary general meeting of the association held yesterday at York. A change in the membership of the Council is also announced due to the retirement of Mr. C. J. Wood (Sale), Mr. H. Breckell (Oswestry) being appointed to fill the vacancy.

The membership of the association now stands at 337, which is equivalent to 92 per cent. of the municipal electricity undertakings in Great Britain. As the Borough of Paisley has refused to pay its annual subscription it is no longer entitled to be represented at meetings of the Association. Associated membership numbers 7. Various joint committees in being before the war have not been reappointed, but the Association has continued to maintain contact with all kindred associations and where necessary to take joint action.

Certain recommendations submitted by Messrs. Kennedy and Donkin, who were appointed by the Council to investigate the position relating to bulk supply charges in the North-East England area, were accepted, and the North-East England Centre of the Association and the supply company concerned have now reached a satisfactory settlement. A satisfactory settlement was also effected between the South Wales and Monmouthshire Bulk Supply Takers' Association, and the South Wales Power Co., while investigations are now proceeding with regard to the Mid-East England Centre. Similar assistance has been offered to the North Wales area.

Radio Relay Systems

Although the Association of Municipal Corporations has stated that in its opinion the Government has no intention of including provisions in a Bill empowering undertakers themselves to operate radio relay stations, the Council has decided to refer the matter to Parliamentary agents so that action may be taken to secure an amendment with the object of obtaining these powers in any Bill which might be submitted to Parliament.

Representations were made to the Electricity Commissioners suggesting that the grants available for the protection of generating plant at the larger power stations should also be available for all other power stations. In reply the Commissioners pointed out that expenditure for the protection of plant which is the subject of grant must be kept within reasonable limits, and it was essential that priority should be given to the larger units which were of the greatest importance in maintaining output. The question of extending the measure of protection would, however, be reviewed from time to time by the Grants Sub-Committee of the National Committee on A.R.P. for the Supply Industry in the light of experience gained as to the effectiveness and the cost of different methods of protection.

The Council decided to prepare a register of undertakings willing to participate in a scheme for the transfer of hire-purchase agreements respecting consumers moving from one distribution area to another. Only half of the members replied to the communication addressed to them and, recording its disappointment at this result, the Council expresses the opinion that the usefulness of any action which might be taken in the members' interests is greatly impaired thereby.

Minimum Consumption Agreements

With regard to the effect of war damage to property supplied with electricity under agreements embodying guaranteed minimum consumption clauses, the Council has been advised by the solicitor to the Association that he has been unable to discover any emergency legislation affecting this point and therefore the general law relating to contracts would apply in such cases. Without any examination of the provision of any particular contract, however, no general ruling can be given, and the Council's opinion is that members who desire advice should consult their own legal advisors.

Numerous communications were received from members complaining of the attitude adopted by certain railway companies in making demands for greatly increased demurrage charges on railway wagons under the Railways (Demurrage Charges) Order, 1939. From assurances given by the Minister of Transport it appears perfectly clear that if undertakings are unable, through no fault of their own, to clear wagons within the free period allowed, they should not be mulcted in these charges.

In connection with the Fuel and Lighting Order, 1939, the Council has asked the Mines Department to reimburse the expenditure already incurred by undertakings, without waiting for the reimposition of rationing. No action had been necessary yet in connection with the resolution passed at the last general meeting that, in the event of any suggestion as to the reintroduction of fuel rationing, the Association's representatives on the National Gas and Electricity Committee should be asked to take the matter into immediate consideration with a view to representations being made to the appropriate Government Departments.

The Council has decided not to proceed with proposals regarding defraying the expenses of representatives attending meetings of executive committees and sub-committees of various centres. Numerous representations made to Government Departments on the subject of the constantly rising cost of coal have been without avail, and a protest was made in January to the Mines Department asking it to urge the Government to take the necessary action to prevent further increases.

All Bills before Parliament which might affect electricity supply interests have been reviewed, but only one called for action, namely that promoted by the Kent Electric Power Co. The Council at once approached the Electricity Commissioners and urged that the present was a most inopportune time to promote the Bill, which was bound to be of a contentious nature, particularly as, on account of their urgent civil defence duties, local authorities were unable to give proper consideration to its provisions and, moreover, it did not appear to be necessary or desirable in the interests of the successful prosecution of the war. A deputation from the Council also waited upon the Commissioners and elaborated the Association's objections to the Bill.

The retiring president of the I.M.E.A., Mr. B. Handley (Portsmouth), and the new president, Mr. J. W. J. Townley (West Ham)

With regard to the activities of the Joint Committee of Electricity Supply Associations, the report goes on to state that Mr. John Mould, who has been chairman since its inception, has relinquished that position in favour of Mr. J. C. Dalton, of the Provincial Electric Supply Association, Mr. B. Handley being elected vice-chairman.

War Damage Legislation

The Joint Committee expended a considerable amount of time in the preparation of a war damage scheme for electricity supply undertakings, but before it had an opportunity of discussing the scheme with the appropriate Government Department, the Government itself introduced a Bill making provision for compensation for war damage to buildings and other immovable property. After considering the Bill the Committee came to the conclusion that electricity supply undertakings should be excluded from its scope, except in respect of Clause 30 (4) (*b*) which related to payments for urgent repairs. The Conjoint Conference of Public Utility Associations, of which the Association is a constituent member, took steps to safeguard the position by causing amendments to be moved in the House, the effect of which was to exclude public utility undertakings from the application of Part II of the Bill.

Subsequently a deputation from the Conjoint Conference waited upon the Treasury and put the case for complete exclusion from the provisions of the Bill, urging that the complete protection of public utilities should be the subject of future legislation. Later the Chancellor of the Exchequer stated in the House of Commons that in view of further legislation upon war damage to public utility undertakings such undertakings should defer insurance of their movable property for the time being.

Owing to the number of cases in which authorised undertakers were arranging supplies to war factories at various rates, an agreement was entered into between the Central Electricity Board and the various associations represented on the Joint Committee fixing a standard basis of charge. In view of the fact that specifications prepared by the War Office for buildings to be erected out of national funds precluded electric cookers and washboilers and appeared to recognise electricity for lighting purposes only, the Joint Committee drew the attention of the Commissioners to the matter, urging them to make representations on behalf of the industry. Although no tangible results have yet been achieved, the Committee is still endeavouring to pursue this matter to a successful conclusion.

Consideration was given to a communication from the Electricity Commission setting out special measures regarded necessary

for securing the due functioning of undertakings and the Joint Committee expressed the opinion that, irrespective of the heads set out in the letter, the best course to be followed would be for individual undertakers to press such claims as they considered might properly be made. An effort to secure exemption for public utility undertakings from filling up the record forms required under the Road and Rail Traffic Act, 1933, for the duration of the war was unsuccessful.

At the invitation of the Electricity Commission the Committee attended a meeting to discuss the provision of certain works which were urgently necessary because of war conditions. It was intimated that it would be necessary to make an Order under the Defence Regulations enabling the Central Electricity Board to put this work in hand, but an assurance was given that this would not in any way prejudice the arrangements contemplated for the operation of the new power stations by the appropriate authorised undertakings.

Regarding the repair of highways suffering from war damage, the Council considers equitable the arrangements under which the public utility undertakings should make good the damage to the apparatus and the local authority should make good the remainder. Among other matters dealt with were the maintenance of essential gas and electricity supplies, meter testing and certification, requisitioning of privately owned wagons, and workmen's compensation liability. Four meetings of the National Gas and Electricity Committee were held, the most important matter under consideration being the rationing of electricity.

In the annual report of the Conjoint Conference of Public Utility Associations reference is made to the activities of that body in connection with wartime legislation affecting public utilities, the coal situation, the War Damage Bill and the position of company and municipal public utility undertakings in defence and evacuation areas.

While the I.M.E.A.'s revenue for the year ended March 31st, 1941 at £11,484 shows an increase of £725 as compared with the previous year, a deficit of £822 for 1939–40 has been converted to a surplus of £1,301, this improvement being achieved through substantial savings in printing costs (£1,000 saving), office and administration expenses (£658), meetings (£658) the annual convention (£516) and subscriptions and donations (£279). In addition £1,500 was reserved for income-tax.

The report also makes reference to the work of E.D.A., the E.A.W., E.R.A. and the B.S.I. in whose work the Association participates.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.

Professional Qualifications and the Services

MAY I be allowed to correct the impression that "Graduate" (Coventry) may have conveyed in his letter in your issue of May 16th. First, however, I consider that he is presumptuous to consider himself so much above a mere tradesman. To graduates of the I.E.E. and any others interested I may say that a passed-out army tradesman is better off than a sergeant with no trade and a sergeant and sergeant-major are better off than a commissioned officer with fewer than three pips. The source of the trouble is that the War Office will not accept civilian standards and before this war did not encourage men to go in for them from the Service. The reason why sergeant instructors are used is that the War Office will insist on putting a good soldier based on 1910 standards into a 1940 technical position.

Any tradesman, with patience, could attain as good results with this material as more qualified teachers. An endeavour is being made to ensure that recruits shall first join the ranks ; this with the acceptance of civilian standards would make the Service more attractive and help the apprentices of to-day upon their return to civil occupation.

Middlesbrough. EX-"TIFFY," R.G.A.

Force-trip Devices

SEVERAL correspondents have drawn attention to the use of the term "force-trip devices" in a recent article of mine. I would say that the article in question was prepared before B.S. 936 was issued and it is appreciated that in this Specification, the much better term "making-current release" is used.

Even so, may I draw attention to the fact that Clause 25 states that "A making-current release (force-trip release) is one which, etc. . . ." and tends, therefore, to retain the force-trip definition as an alternative. It may also justify the use of the term in my article !

Egham, Surrey. R. T. LYTHALL.

An Installation Section

I.E.E. Announcement

IN the report of the Council of the INSTITUTION OF ELECTRICAL ENGINEERS for 1940–41, it was stated that the proposal to set up an Installation and Utilisation Section, which was well advanced at the outbreak of the war, had recently been under review, as not withstanding the difficulties attending such a step in wartime, circumstances had arisen which indicated that it should no longer be postponed. In addition to the fact that such a Section would fill a definite place immediately in the activities of the Institution, attention has recently been drawn to the importance during the post-war reconstruction of that sphere of the Institution's work which would be covered by the proposed Section, the establishment of which would serve to direct thought towards the problems that would arise.

The Council has now decided that the new Section shall be set up forthwith, under the name of the "Installations Section," which will be conducted on the lines of the existing Wireless, Meter and Instrument and Transmissions Sections. Members of any class of the Institution may apply for membership of the Section and no supplementary subscription will be payable. Those desiring to become members of the Section must satisfy the Section Committee that they are actively engaged in work coming within the scope of the Section, and for this purpose they should complete a membership application form, which is being circulated, and return it to the Secretary.

The official definition of the scope of the Section is as follows:— "The Section shall have within its scope all matters relating to the study, design, manufacture, construction, installation, maintenance, operation and employment of equipment and apparatus used in electrical installations inside and outside buildings, including those for lighting, heating, ventilating and domestic purposes, and for general industrial, agricultural, mining and marine applications, but excluding matters relating to heavy engineering and functions lying within the scope of the Wireless, Meter and Instrument and Transmission Sections."

It is hoped that it will be possible to make an announcement about the first meeting of the Section in the July number of the *Journal* (Part I).

Institution Meetings

TWO ordinary meetings have been announced by the INSTITUTION OF ELECTRICAL ENGINEERS. At the first, on June 26th (6 p.m.), two papers will be read and discussed: "Metal Rectifiers," by A. L. Williams, Ph.D., M.Sc., and L. E. Thompson, B.Sc., and "The Characteristics and Applications of the Selenium Rectifier," by E. A. Richards, B.Sc. (Eng.). Members desiring to contribute to the discussion are asked to advise the secretary in advance. Copies of the papers can be obtained from the Secretary about seven days before the meeting.

The second is a formal meeting at 12.30 p.m. on July 10th, at which the sole business will be a ballot for the election of candidates for membership and transfer whose names will be suspended at the meeting on June 26th.

Technical Teachers' Conference

IN his presidential address at the two-day annual conference of the Association of Teachers in Technical Institutions, held in London at Whitsuntide, Mr. S. H. Moorfield (Mining and Technical College, Wigan) referred to the various voluntary forms of part-time war service being performed by teachers. For example, the manufacture in many college engineering workshops of whatever tools and supplies they were capable of making; the training in technical laboratories and workshops of men for scientific and engineering work in the forces; in conjunction with the Ministry of Labour, college-organised schemes of training men and women for industry to supplement skilled workers already busy; and the recognition of the possibilities of local college links with the Air Training Corps of youths.

Turning to after-war proposals, Mr. Moorfield pointed out that one of the implications of the prospective raising of the school-leaving age was the revision of the national educational structure as a whole. The school career would then extend into the period during which children generally selected some occupation or profession and so the curriculum could not be completely divorced from that choice. The school life would be an unhappy one if the course of study was not given a vocational flavour.

The most important domestic event of the past year was the joint membership arrangement between the A.T.T.I. and the National Union of Teachers.

Cable Records

Advantages of the Photographic Method

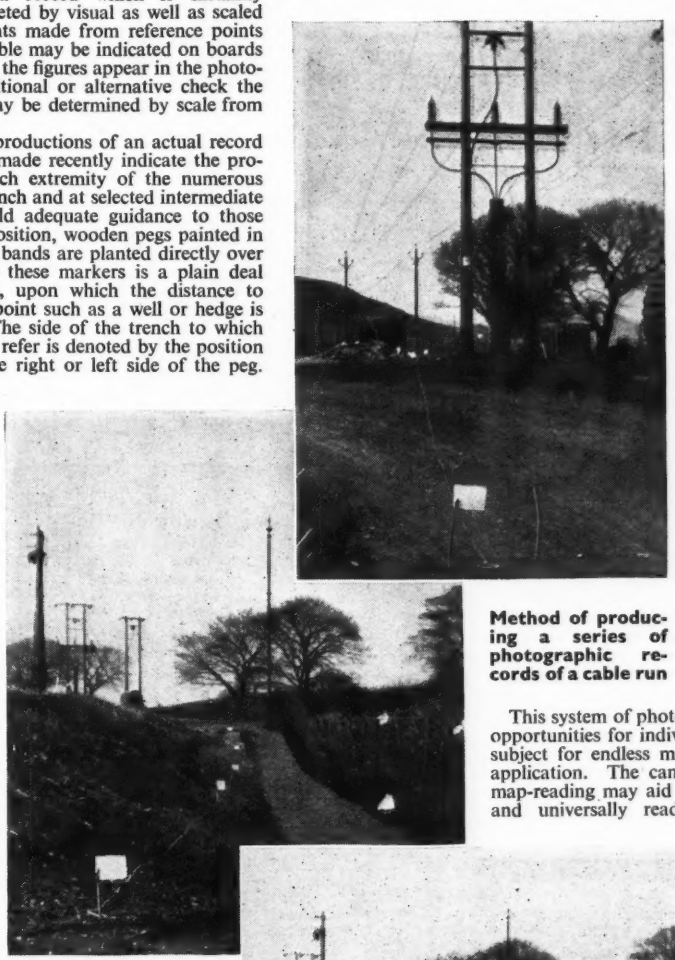
By J. L. Gaved

THE position of underground cables is usually recorded on large-scale maps and no attempt appears to have been made to procure such records by means of a camera although this method has the virtues of being fully illustrative and of providing infallible evidence and should be considered by mains engineers.

Photography yields a record which is instantly recognisable and interpreted by visual as well as scaled dimensions, measurements made from reference points to the position of the cable may be indicated on boards set up on the site so that the figures appear in the photograph, while as an additional or alternative check the position of the cable may be determined by scale from the prints.

The accompanying reproductions of an actual record of a 33-kV cable route made recently indicate the procedure adopted. At each extremity of the numerous straight runs of cable trench and at selected intermediate points calculated to yield adequate guidance to those who will later seek its position, wooden pegs painted in two colours in alternate bands are planted directly over the cable. Attached to these markers is a plain deal board, preferably black, upon which the distance to some adjacent location point such as a well or hedge is inscribed with chalk. The side of the trench to which the measurement figures refer is denoted by the position of the board either to the right or left side of the peg.

This method may be elaborated in several ways, as for example, by the provision of a second measurement on the board which denotes the distance of that point from the initial peg so that the total length of cable installed is also made known. This additional information becomes of importance where joints are to be located and greatly facilitates electrical tests under breakdown conditions. Failing the provision of this information, the joints may be located on the photograph by arranging three pegs relative to some prominent feature, such as a gate post, thus providing a triangulation which leaves no doubt as to its position.



Method of producing a series of photographic records of a cable run

Cable routes, which follow a main highway pavement, for example, usually present no difficulties, as railings, walls, or kerb edges give easy location points, but in rural areas obstacles are encountered which necessitate clear tabulation of the photographic sequence.

A sequence must be maintained in all records and in good clear runs this is achieved by always including the last peg of any particular length in the next photograph taken along the route. Thus if we have pegs No. 1 and 2 in the first photograph, peg No. 2 must appear in the foreground of the print showing peg No. 3.

Where obstacles are encountered, such as a hedge or a wall beneath which the cable has been laid, the rule to be observed is that the photograph made after a view of the obstacle has been obtained, must be taken from as near that obstacle as is physically possible, the obvious position being on top of the hedge or wall. Where this is impracticable, as with a thorn hedge, then the photograph must be taken as close to the remote side as possible.

In surmounting such obstacles it must be kept in mind that some person who is a stranger to the neighbourhood, and to photographic recordings, may be called upon to read these signs at a much later date when maybe cameras will have been displaced by electrical search gear beyond present ken. The recording of the distances of location points from the commencement of the cable run would assist greatly in this particular respect as any doubt inspired by a jump in the photographic sequence is readily allayed.

When denoting distances from a starting point, cables inside substations or on terminal poles should be included as they are part of the electrical lengths which would be required for fault location.

A general programme having been established along the lines indicated, the most advantageous lengths of cable route for any one photograph must be decided. This calls for individual treatment. The essence of a good record is clarity and where the ground contour changes rapidly or the cable route deviates, it is wise to utilise more film to secure accurate information, especially when distances are not indicated but must be scaled off the photographs.

The one guide in selecting maximum lengths is the legibility of the figures chalked on the distant peg board when the view is a clear run on flat ground. This may be obtained by making one or two test photographs and from the evidence they provide a suitable size for the figuring may likewise be determined.

This system of photographic records is bristling with opportunities for individual expression and provides a subject for endless modifications in the technique of application. The camera method as compared with map-reading may aid the evolution of some standard and universally readable form acceptable to the authorities upon whom devolves the legal responsibility of providing records of installed plant.

With reference to the scaled dimensions extractable from the photographs, this presumes circumstances which render direct readings unobtainable for various reasons or a preference for this method. The same or a similar method of marking the cable route must be adopted in general for the essential initial photograph from which the scale applicable to all subsequent photographs will be derived.

In taking the photographs the camera must be handled in a definitely constant manner. If one person does the complete record, the scaled distances will not vary to any significant extent on any photographs of the sequence. Those reproduced here were taken with an ordinary box camera held in the hands, but it is

preferable, of course, to employ a tripod and to level the camera accurately.

The constants of the camera will be revealed in the basic print obtained and provided the focus of the lens is maintained constant there will be no error likely seriously to mislead one in subsequent determinations. The illustration of the basic point with superimposed lengths is self-explanatory, although in practice a strip of celluloid or similar transparent material is scored to provide a common reference.

A useful guide in procuring good results is to maintain the maximum length of cable route to correspond with the focus obtainable on the camera when the latter is provided with such an adjustment. This may be a maximum of 100 ft. and if this should raise visions of innumerable photographs in order to record any substantial length of cable, it is nevertheless better to restrict the range to this extent. Otherwise in the perspective view the remote horizontal distances become crowded and very difficult to delineate with any accuracy on the basic print.

An alternative to an ordinary inexpensive "snapshot" class of camera is an instrument which will give clear definition in the region of 100 yd. or so. With a print of quarter-plate or half-plate size the accuracy will be increased proportionately whilst the records will for many reasons be much more desirable in such dimensions. The enlargement of small prints is not to be recommended.

In whatever final form the record is produced, the reality of the photograph will be found of inestimable value in providing instant location of any hidden cables or pipelines in a manner which no large scale map dotted with innumerable dimensions in small type can achieve.

Arc-Suppression Coils

Theory of Their Operation Explained

By G. W. Stubbings, B.Sc., A.M.I.E.E.

THE object of an arc-suppression device is to force the capacitance currents from the non-faulty lines of a three-phase system with an earth fault to return to the source of supply, not through the fault but through the neutral earth connection. The usual explanation of the function of the arc-suppression coil is often found unsatisfactory, partly because this explanation involves the equivocal idea of tuning an inductance, and partly because it is based upon the conception of two currents equal in magnitude and opposite in direction meeting at the fault and cancelling to a zero resultant. The usual explanation is analytic, that is, it examines the conditions when the arc-suppression device is in operation. The following alternative explanation is of synthetic nature, that is, it is built up on a consideration of simpler equivalent circuits in which the conditions in an earthed three-phase transmission are simulated.

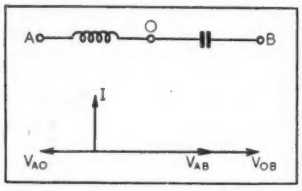


Fig. 1.—Simple circuit with pure inductance and capacity in series

In fig. 1 is shown diagrammatically a simple circuit in which a pure inductance and a capacitance are connected in series with a single-phase source of alternating current. The total impedance of this circuit is known to be equal to the difference of the inductive and the capacitative reactances. If the capacitative reactance is the greater the whole circuit is virtually capacitative, and the reactance of the inductive component can be considered negative. Similarly, if the inductive reactance is the greater, the capacitative reactance can be considered to be negative. If the two reactances are equal, we have the condition of what is called resonance; the current is limited only by the resistance, and, if this is negligible, the current and hence the voltage drops on the two components become very large.

Thus, if the capacitance is fixed and the inductive reactance is variable, then, as this reactance is increased from zero, the current will rise to a theoretically infinite value as the two reactances become equal, further increase of the inductive reactance reversing the current which now decreases. The vector diagram of fig. 1 shows the condition when the inductive reactance is about one-third of the capacitance reactance. The voltage drop on the inductive reactance V_{AO} leads the current, and is opposed to the drop in the same direction V_{OB} in the capacitance. The difference of these two drops is the supply voltage, the vector of which is V_{AB}.

Now let us consider the circuit shown in fig 2. Here two equal capacitances and an inductive reactance are connected in star to two lines and the neutral of an insulated three-phase system, which is supposed to be free from other capacitance to earth. The star point of the circuit is connected to earth. We may consider this circuit to be composed of two positive capacitative reactances and one negative capacitative reactance. Were all three reactances positive capacitative, then, as the reactance connected to the neutral was increased, the position of the point representing the potential of the common star connection of the three components would move from the vertex N of the fundamental triangle ANC of the vector diagram, in the median towards the centre point of the base AC, and this point would always be situated in the triangle.

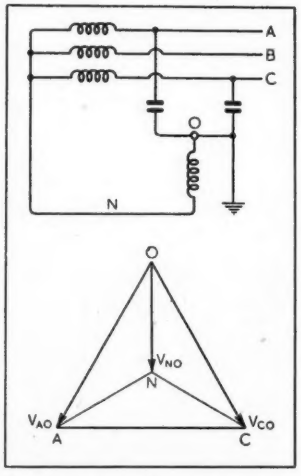


Fig. 2.—Connection of capacitative and inductive reactances in an insulated three-phase system

When, as in the circuit considered, the capacitative reactance connected to the neutral is negative, then, as this reactance is increased, the point O in the vector diagram must move from N away from the base AC of the fundamental vector triangle, and, further, as the components connected to lines A and C are of equal ohmic value, this point will always lie on the prolongation of the median through O. It follows, therefore, that there will be a certain value of the negative capacitative reactance connected to the neutral that will make the point O coincident with the third angular point of the vector triangle of line voltages.

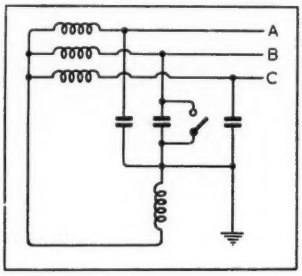


Fig. 3.—Three-phase system with neutral earthed through an arc-suppression coil

It is easy to calculate the ohmic value of the negative capacitative reactance which leads to this condition, which is shown in the vector diagram. The current from lines A and C will each be equal in value to V/X_c where V is the line voltage and X_c the ohmic value of the reactances connected to these lines. These currents, being 60 deg. different in phase, will produce a resultant of $\sqrt{3}V/X_c$, and this resultant must be equal in value to the current flowing from the neutral through the negative capacitative reactance X_R. Thus $V/\sqrt{3}X_R=\sqrt{3}V/X_c$ so that when $X_R=\frac{1}{3}X_c$, the potential of the point O of the circuit is the same as that of line B. It follows that if, in this condition, line B is earthed, no current can flow into the earthed point, for the two earthed points of the circuit are at the same potential.

The circuit of fig. 3 represents diagrammatically a three-phase system having its neutral earthed through an arc-suppression coil. This coil is an inductive reactance or a negative capacitative reactance of such a value that it gives the conditions of fig. 2 with the capacitances of two lines to earth. The actual capacitances of all three lines are approximately equal, so that these capacitances constitute a balanced star-connected load, the star point of which has the same potential as the neutral.

Normally, therefore, no current flows in the neutral earth connection through the suppression coil. The effect of an earth fault on, say, B line, is to short-circuit the capacitance of this line and to give a condition represented by the circuit and vector diagram which are given in fig. 2.

The whole of the capacitance current from the non-faulty lines passes back to the supply through the neutral earth connection and, consequently, none of this current can enter the fault.

COMMERCIAL and INDUSTRIAL NEWS

New Limitation of Supplies Order. Factory Lighting Installations.

Limitation of Supplies

A NEW Limitation of Supplies (Miscellaneous) Order (No. 11) has been made by the Board of Trade (S.R. & O. No. 700; Stationery Office, 5d. net). This operates from June 1st, and so far as electrical goods are concerned the existing qutoas are not altered with the exception of " laboratory, electrical and other industrial porcelain," the quota for which is reduced from 50 to 40 per cent. Persons who are liable to registration under the Order and have not yet applied for registration are required to do so by June 15th. Forms are obtainable from the Industries & Manufactures Department 2, Board of Trade, Carlton Hotel, Bournemouth.

It is noted that a manufacturer exempted from registration on the ground that the value of any class of controlled goods which he has supplied did not exceed the prescribed monthly limit must nevertheless apply again for registration if in any month after the beginning of the Order he supplies controlled goods of any class to a value exceeding £100.

The Board of Trade urges shopkeepers to co-operate in maintaining supplies in areas subject to air-raid damage. Schemes should be arranged whereby " bombed " traders will surrender their rights to obtain replacement goods to " intact " traders and the latter will attend to the marketing of these goods. Such schemes will involve " clearing house " machinery for ensuring an equitable distribution of the proceeds of this marketing.

The Order contains a list of organisations to whom goods (including domestic electrical appliances) may be supplied on an unrestricted basis, including hospitals, registered ships' stores dealers and Women's Voluntary Services for Civil Defence.

The E.I.B.A.

In reminding readers of the annual lunch and meeting of the E.I.B.A. on June 17th, it may be well to mention that at the outbreak of war the Association lost well over £2,000 a year from the curtailment of social functions alone, but that the principal backbone sources of its income have been maintained, and loss under other heads has to a large extent been made good. The number of beneficiaries continues to increase, and the amount of work which the Association has done in helping people in other than financial ways has increased by leaps and bounds, largely by reason of the many wartime regulations with regard to dependants' allowances, civil pensions as a result of bombing, compensation allowances, and so on.

Trading with Syria and the Lebanon

The Board of Trade and the Ministry of Economic Warfare announce that Syria and the Lebanon are to be regarded as enemy occupied territory for the purpose of the Trading with the Enemy Act and of economic warfare.

Standardisation in South America

A resolution adopted at the fourth convention of the South American Union of Engineers' Association held in Lima, Peru, towards the latter part of January, 1941, has resulted in definite steps being taken to set up the proposed South American Standards Committee, which is to be known as the " Cosan " (Comité Sudamericano de Normas). The new movement, largely promoted by the Argentine standards organisation, the " Iram," will result in a linking-up of the standardisation work to be carried out in the different republics. The Cosan will be the focal point for the interchange of information and the preparation of industrial standards suitable to the various countries constituting the Committee. The broad question of the uniformity of types throughout the South American Continent will be one of its main concerns.

The number of South American countries having standards organisations being limited, the new Committee will urge their creation in the countries where they do not at present exist, thus forming ultimately a strong continental block, the work of which will have considerable influence on international trade.

The Cosan is to be definitely constituted in July, and a meeting will be held in Rio de Janeiro, when the statutes and bye-laws will be adopted and the officers elected. The British Standards Committee in the Argentine Republic, which is in close touch with the Iram, will follow the progress of the Cosan, and through the B.S.I. offices in London keep British industry informed of developments.

Lighting of Armament Factories

Owing to the intricacies of modern war weapons and the necessity for maximum precision as well as speed the provision of an efficient lighting scheme is an absolute essential in the armament factory of to-day. Furthermore, with the need for blacking out the works and for maintaining production throughout the twenty-four hours more and more reliance has to be placed on artificial illumination. The accompanying illustration of a tank factory is typical of a very large number of installations in which Benjamin lighting equipment is utilised.

Benjamin lighting equipment has been installed in this tank factory to give a high intensity of illumination on the working plane

Importation by Parcel Post

Importers are notified by the Import Licensing Department of the Board of Trade that in future the standard form of import licence will normally not be available for importation by post. Where the importer desires to import by post he must make special reference to this on his application form when the licence, if granted, will be endorsed accordingly.

Trade Facilities Guarantees

A statement issued by the Treasury shows that during the year ended March 31st, 1941, sums issued from the Consolidated Fund in fulfilment of guarantees given under the Trade Facilities Acts amounted to £65,486, making a total advanced of £9,761,053. During the year £433,111 was repaid, making a total of £3,339,418.

Debts to Persons in Enemy Territory

Persons who owe money, which would, but for the war, have been paid to any person in enemy or enemy occupied territory are reminded that they are under a legal obligation to pay the money to the Custodian of Enemy Property (Sir Ernest Fass), Public Trustee Office, Kingsway, London, W.C.2, except in the case of debtors in Scotland, who should pay Mr. E. E. Parker, New Register House, Edinburgh, 2, and debtors in Northern Ireland, who should pay Major F. G. Hill, Supreme Court of Judicature, Royal Courts of Justice, Belfast. Payments should therefore be made forthwith in the case of the following territories in enemy occupation or control : France (including " unoccupied " France), French North Africa, Monaco, Denmark, Roumania, Bulgaria and Hungary. The question of debts owing to persons in the Allied territories in enemy occupation is under consideration, and a separate announcement on this subject will be made later.

Small Alternator Manufacture in Australia

The difficulty of obtaining small alternators from overseas has led to the consideration of their production in Australia. The *Electrical Engineer and Merchandiser* (Melbourne) mentions that one concern in Sydney is manufacturing a salient pole revolving field alternator in sizes from 5 to 30 kVA for standard frequency and voltage, or to any special requirements. These machines are fitted with ball or roller bearings and are designed for speeds from 600 to 1,500 RPM. Exciters are direct coupled or belt driven as desired. Apart from the local market, orders are being fulfilled for Egypt, the Pacific islands, and the Dutch East Indies.

Sulphuric Acid Prices

By Direction No. 3 under the Control of Sulphuric Acid (No. 2) Order, the No. 1 Order is revoked and permission is given to raise the basic prices of battery and accumulator and reagent acid by 25 per cent. New prices are also stipulated for acid in bulk of various grades.

Factory Lighting Exemption

The Chief Inspector of Factories has exempted from the requirements of Regulations 2 (a), 3 (a) and 3 (b) of the Factories (Standards of Lighting) Regulations, 1941, the danger buildings of explosive works.

Annealing Nickel Alloys

Nickel-containing alloys like " Monel " metal and " Inconel " work-harden more rapidly than mild steel and consequently require to be annealed more frequently and with greater care, to soften them for removing the effects of cold rolling, or drawing, and similar forming operations. Authoritative guidance in some detail, together with advice on the pickling and surface cleaning of such metals, is to be found in a 16-page booklet compiled by Henry Wiggin & Co., Ltd., Grosvenor House, Park Lane, London, W.1.

Electric furnaces are increasingly used as sources of heat for such processing because of the remarkable uniformity of distribution of their temperature, avoidance of sulphur

attack and ready adaptability. Furnaces of conventional type are employed with well insulated refractory walls on which are mounted nickel-chromium heating elements in the form of strip, rod, or wire, invariably automatically controlled, large furnace elements being often split into zones.

The Millionth Cooker

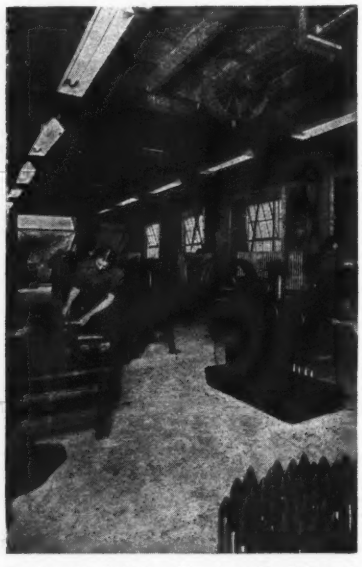
The Hotpoint Company of Chicago recently announced the production of its millionth electric cooker. According to *Electrical Merchandising*, this has been decorated in 24-carat gold and is to be presented to Mr. Henry Ford for the Edison Institute Museum, Greenfield Village, Dearborn, Michigan.

War Risks Insurance

The Board of Trade has made the War Risks (Commodity Insurance) (No. 3) Order, 1941, dated May 27th, 1941, which continues the present premium (¾ per cent. per month) during the three months commencing June 3rd.

Fluorescent Lighting in Industry

Remarkable progress is being made with fluorescent lighting in America. Last year over ten million fluorescent tubes were produced, while during 1941 it is anticipated that this figure will be increased to more than twenty million tubes and that some 250 million dollars will be expended on fluorescent lighting generally. In this country too, the figures, if available, would indicate that despite the war, appreciable strides have, and



Portion of a shell shop illuminated by "Osira" fluorescent tubes

are still being made, both in development and application.

Naturally, the lighting of industrial premises has taken precedence and it is in these establishments that the newest development, namely, the 5 ft. fluorescent tube, is meeting with conspicuous success. Experience has proved beyond doubt that many tedious and sometimes exacting operations have been facilitated by its adoption, either as the main source of light, or as a supplementary or localised light over precision machines and test benches. The tendency in industry is more and more to place quality of light first and foremost, and the adoption of this policy has resulted in increased output, fewer accidents, and an appreciable improvement in the health and contentment amongst employees.

In one branch of engineering, namely that of ball and roller bearing inspection and measurement, the low surface brightness of the tube coupled with its cool burning characteristic, allows a mounting height of as low as 20 ins. without causing discomfort to the operatives by reflections from the polished surfaces or heat from the tube. Much the same sort of thing applies to the viewing rooms in engineering works. The inspection and gauging of finished metal parts for the aircraft and allied industries is often now carried out solely by the light of fluorescent tubes. Finely calibrated instruments measuring to one five-thousandth part of an inch, and polished surfaces are common to this department. Consequently, a light source that is glareless, not productive of deep shadow and of uniform intensity is a virtual necessity.

E.A.W. and Wartime Cooking

Continuing its scheme for giving useful hints on the preparation of wartime dishes, the Electrical Association for Women held a meeting at its headquarters on May 30th, when an opportunity was given to sample various examples of Continental cooking. Though somewhat handicapped by the lack of such ingredients as butter and cream, the recipes provide helpful ideas for the housewife to introduce variation into meals despite restrictions in materials available. The recipes are included in the June *Cheerful Rationing*, published by the Association, price 2d. post free.

French Electrical Industry Helps Germans

According to evidence accumulated by the Government, French industry is now assisting German war production on a considerable scale. M. Bouthillier, who is Finance Minister in the Vichy Government, himself proclaimed in a public speech at the opening of the Paris Fair a short time ago that one-quarter of the French mechanical and electrical industries were now working for the Germans. This has been going on for some time.

Radio Sets for India

According to *Indian Engineering*, Indian imports of radio sets are increasing so rapidly that the Radio Manufacturers' Export Group in Britain has paid particular attention to the provision of radio sets for export to India and plans have been made so that the Group's members, who comprise all the principal radio manufacturers in the United Kingdom, should be in a position to supply a great part of the Indian market. The Group's estimated production for India totalled 35,000 receivers for the twelve months ending June 30th, 1941.

Electrical Equipment Sales in America

Sales of heavy electrical equipment for the first quarter of 1941 reached new high records, according to the National Electrical Manufacturers' Association (U.S.A.). Orders for motors and generators were 169 per cent. higher than in the same quarter of 1940 and 255 per cent. more than in the same quarter of 1939. Transmission and distribution equipment rose 128 per cent. on 1940 and 192 per cent. on 1939, and industrial materials 73 per cent. on 1940 and 142 per cent. on 1939.—*Reuter's Trade Service* (*New York*).

Standard Lac

The existence of many varieties of lac and multiplicity of uses have influenced the make-up of B.S.954, which is concerned solely with "whole" natural substance, meaning all lac whatever its physical form (apart from debris caused by insects and other adventitious matter) preserved throughout processing operations to which the material may have been subjected. Tests for each of the many properties of lac are set out in appendices, while special requirements are satisfied by detailing first those clauses which apply generally irrespective of use, followed by clauses which have specific application, for example, to electrical use. Copies of this new specification are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1., price 2s. 3d. post free.

Specification for Glass

The first portion of B.S.952, which has been prepared at the request of glass makers themselves, is divided into five sections defining different kinds of glass, including transparent, translucent, prismatic, lead, natural tinted, thermolux, non-actinic, etc.

The second portion deals with terminology, describing such typical working processes (with diagrams) as cutting, obscuring, decorating, silvering, gilding, staining firing and bending. Copies of this new specification are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1., price 3s. 9d. post free.

"Rope Talks"

"The Western Gateway of Canada," "Farming in a Test Tube," "Bicycles are Cheap," "Making Synthetic Rock from Mother Earth," "The Duke's Canal" and "On the Throwing Wheel of Centuries" are the titles of articles contained in "Rope Talks" No. 16, published by British Ropes, Ltd. The editor informs us that some of the mailing lists were destroyed by fire at the company's printers and requests us to ask readers who do not receive copies to notify him at British Ropes, Ltd., Anchor & Hope Lane, Charlton, London, S.E.7.

"Where to Buy"

The 1941 issue of "Where to Buy," published by "Where to Buy," Ltd., 49 Wellington Street, Strand, London, W.C.2, price 2s. 6d. (post free), provides its usual convenient and reliable index to the principal sources of supply of electrical equipment, including power plant, domestic appliances, radio apparatus, etc. The index comprises 150 pages and reference is made very simple by the lay-out adopted. Telephone numbers and telegraphic addresses are included.

Changes of Address

S. Rogers & Co., Ltd., have moved to 14, Maple Street, London, W.1 (telephone: Euston 2016).

G. P. Dennis, Ltd., have moved to St. Michael's Street, Chester (telephone: Chester 3763-4).

The Simplex Electric Co., Ltd., has removed its Plymouth office to "Rodene," Roborough, Plymouth (telephone: Plymouth 71984). The address of the store is Rear of Athenæum Arcade, Plymouth.

Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced and illustrated leaflet (X.9292) describing mercury-in-glass switches and relays.

T. Leeman, 34, Palmerston Road, South Acton, London, W.3.—Lists illustrating various types of "Vici" electric soldering irons, formerly imported from Sweden but now manufactured at the company's own works.

TRADE MARK APPLICATIONS

THE following applications have been received for British trade marks, objections to which may be entered within a month of June 4th:—

Concord. No. 613,789, Class 6. Various metal goods including electric cable posts, clamps, etc. The Concordia Electric Wire Co., Ltd., Trent Mills, Derwent Street, New Sawley, Long Eaton, near Nottingham.

Lamp bulb design in red, white, blue and grey. No. B610,541, Class 11. Electric lamps or bulbs and flash lamps. National Carbon Co., Inc., 30, East 42nd Street, New York. Address for service, c/o Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, E.C.2.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

FEON hair dryer.

Machine for producing tape from 36-in. cloth.

ELECTRICITY SUPPLY

Glasgow Transport Power. Further Grampians Discussions.

Birkenhead. — INCREASED CHARGES.— Electricity Committee recommends that the charges for electricity be increased by 7½ per cent., such increase to apply to all those consumers whose tariff is not adjusted according to the price of coal.

Blackburn.—INCREASED CHARGES.—Mr. R. H. Harral, the Corporation electrical engineer and manager, has recommended to the Electricity Committee that the general tariffs be advanced by 7½ per cent. The special tariffs for housing estates and assisted wiring will be covered by an increase of 1d. per week. Large power consumers, subject to increased charges under the standard fuel clause, are not affected.

Blackpool. — INCREASED CHARGES. — The Corporation Electricity Committee has increased charges by a further 5 per cent. making in all an additional charge of 10 per cent.

Bournemouth.—SAVING OF COAL.—To save coal and reduce the volume of smoke now caused by the use of inferior coal, the Corporation Transport Committee is to alter boiler grates at the generating station at a cost of £800.

Cardiff.—SUPPLY FOR PUMPING STATION.— The Corporation Electricity Committee is to provide an electricity supply to a pumping station at a cost of £352.

Chester.—SHELTER LIGHTING.—By 23 votes to 10, the City Council has referred back for further consideration a motion to spend £2,000 on installing electric lighting in communal domestic shelters.

TRANSFORMERS. — The Corporation Electricity Committee is seeking sanction to borrow £3,200 for substation transformers.

Durham.—SCHOOL LIGHTING.—The County Education Committee is to install electric lighting at Eldon Lane School at a cost of £260 and overhaul lighting at Blaydon West School at a cost of £457. The Board of Education has approved the expenditure of £213 on the installation of electric lighting at East Stanley School.

Eston.—LOAN SANCTIONED.—The U.D.C. Electricity Committee has obtained sanction to borrow £500 for mains and services.

Friern Barnet.—PUBLIC LIGHTING CHARGES. Owing to increased costs the Northmet Power Co., is to increase public lighting charges, mainly for street signs, by 12½ per cent.

Glasgow.—EMERGENCY SUPPLY FOR TRANSPORT SERVICES.—With regard to the arrangements proposed for securing an emergency stand-by electricity supply from the grid for the operation of the transport services in the event of damage being sustained to Pinkston power station, the Town Clerk has reported that under the Electricity Supply Act, 1926, it was not competent for the Central Electricity Board to enter into a direct agreement with the Transport Department for the supply in question; that it would be necessary to furnish the supply through the Electricity Department, and that it was proposed to adjust an inter-departmental agreement between the Transport Department and the Electricity Department to give effect thereto, including a provision to ensure that any additional expenditure which might otherwise be incurred by the Electricity Department arising out of the provision of the stand-by supply will be borne by the Transport Department. The Electricity Committee has approved the report and has agreed that it will be remitted to the Town Clerk and the manager in consultation with the convener and the sub-convener, to adjust the terms and conditions of the arrangement to be entered into between the Transport Department, the Electricity Department and the Central Electricity Board.

MAINS EXTENSIONS.—Mains are to be extended at a cost of £3,494.

SUBSTATIONS AND METERS.—Sanction is being sought to utilise out of surplus revenue £1,250 for substations and £15,000 for meters.

Grampians. — GLEN AFFRIC SCHEME. — The Bill to confirm the Grampian electricity scheme, already approved with modifications by a Parliamentary Commission, is to be considered by the House of Commons. It is understood the Whips will not function and that it will be left entirely to a free vote.

Presiding at the annual meeting of the Association for the Preservation of Rural Scotland held at Edinburgh, the Master of Polwarth referred to the scheme, and said that most people were agreed that it should be postponed until the end of the war, and taken as part of a comprehensive scheme in planning the development of the Highlands. Professor F. G. Baily, M.A., F.R.S.E., M.I.E.E. (Emeritus Professor of Electrical Engineering, Heriot-Watt College, Edinburgh), referred to the question of water-power in the Highlands, and said that power should be developed with a glen as a unit. He was opposed to big schemes, because they were spoiling the whole idea of developing the water where it was and using it where it was.

The Aberdeenshire County Council Finance Committee on June 6th agreed to recommend that the Council support the Grampian Electricity Provisional Order for additional water power. The Convener said that in the Highlands there was a certain amount of opposition to the Order, but, so far as Aberdeenshire was concerned, it was to their interest to see that there was a bigger margin of power available than was the case now. Aberdeenshire had been asked by the company to support the Order. The Finance Committee was of the opinion that the position with regard to the margin above supply in Aberdeenshire, which was largely interested, was such as to justify the promoters in proceeding now in order that a further supply should be available at the earliest possible date. It was of opinion, also, that the rights of the Highland area were safeguarded by the insertion of the clause that the supply of electricity generated by the company "shall be used, in the first place, for the benefit of the locality." It was also pointed out that the large rating revenue derived from the undertaking went mainly to the Highland area, where the works would be situated. Further, it was emphasised that the development of the undertaking had been rendered possible by the revenue derived from the counties outside the Highland area. The Committee directed that the county clerk should communicate with the members of Parliament for the county and ask for their support to the scheme.

Huddersfield. — NEW SUB-STATION. — Approval has been given to the erection of a sub-station.

Jedburgh.—STREET LIGHTING.—A modified street lighting scheme costing £50 is to be introduced next winter.

Kettering.—SHELTER HEATING.—Following experiments conducted by the electrical engineer on the heating of air raid shelters, the Corporation is to seek from the appropriate Government Departments an indication as to the extent to which the installation and maintenance of electric heating in shelters would rank for grant.

Lanark.—SCHEME POSTPONED.—The County Council at its last meeting agreed to delay carrying into operation a proposal that a separate lighting department should be set up and that a public lighting engineer should be appointed. It was objected that this was not an opportune time to put the proposal into effect.

Lancaster. — NEW SWITCH-HOUSES. — The Corporation Electricity Committee is seeking sanction to a loan for the erection of switch-houses.

Manchester. — SUBSTATION EQUIPMENT.— The Corporation Electricity Committee has obtained sanction to borrow £11,856 for sub-station equipment.

Ossett.—OVERHEAD LINES.—The Corporation is being asked by the Electrical Distribution of Yorkshire, Ltd., to approve a proposal for the erection of overhead lines in order to supply power to a colliery company.

Scarborough. — SUBSTATION EQUIPMENT.— The Town Council has received consent of the Electricity Commissioners to borrow £655 for substation equipment.

Scunthorpe.—POWER TARIFF.—The Town Council has adopted the following tariff for power supplies:—Under 50 kW maximum demand, first 1,000 kWh per quarter 1½d., next 1,000 kWh 1¼d., all over 1d.

Sheffield.—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £4,618.

Southgate.—BALING MACHINE.—An electric baler costing about £175 is to be purchased by the Corporation Cleansing Committee.

Southport.—BIRKDALE UNDERTAKING.— The Corporation Electricity Committee has appointed a sub-committee to deal with matters arising from the acquisition of the undertaking of the Birkdale District Electricity Supply Co., Ltd., including staff, reorganisation, alterations, additions to plant, etc. It was pointed out at the Town Council meeting that the Birkdale supply was DC, and after the war would have to be converted to AC, and expenditure of £25,000 to £30,000 would have to be incurred. The sub-committee will function only for the period of the war.

Stone (Staffs.).—REDUCED CHARGES FOR WALTON ESTATE.—The U.D.C. Electricity Department has decided to reduce the minimum fixed charge for electricity supplied on the multi-part tariff to flats on the Walton Estate from 12s. 6d. per quarter to 8s. A tender of £5,545 for cables for supplying electricity to the new estate has been accepted.

Sunderland.—SCHOOL SHELTER INSTALLATIONS.—If the Board of Education will refund the cost the Education Committee is to spend £6,566 on electric lighting, heating and ventilating of school shelters.

Whitworth.—LOAN FOR SUB-STATION.—The Urban District Council is applying for sanction to borrow £1,900 for a sub-station.

York. — LOANS SANCTIONED. — The Electricity Committee has obtained sanction to borrow £13,953 for mains, £14,000 for plant and £2,019 for switchgear.

TRANSPORT

Fleetwood.—ACQUISITION TO BE DEFERRED. —The Town Council is seeking permission from the Ministry of Transport to defer for three years any action in connection with the acquisition of part of the Blackpool-Fleetwood tramway which lies within Fleetwood area.

London.—ST. PANCRAS.—The Borough Council Special Emergency (Finance and General Purpose) Committee has given authority for work to be proceeded with for the removal of abandoned tramways, salvage of metal, and the reinstatement of certain tramway roads in St. Pancras.

Manchester.—TROLLEY BUSES.—The Manchester Corporation (Trolley Vehicles) Order, 1941, gives the municipality power to provide, equip, maintain and use trolley buses along a specified portion of Moston Lane, providing also for turning points.

Southend.—PROPOSED TRAMWAY ABANDONMENT.—The Highways and Works Committee is willing to recommend the Town Council to proceed with the abandonment of the Corporation's tramways, provided that the Ministry of Transport agrees to recommend the Treasury to sanction a loan covering the costs of track removal and the installation of trolley bus overhead equipment. Track removal and temporary reinstatement of the highway has been estimated to cost £12,100.

South Shields.—REVISED FARES.—The Corporation Transport Committee has revised its fares for trams and trolley buses. In addition to raising certain fares by ½d. it is proposed to abolish all 2½d. and 3½d. double journey tickets as well as the 2½d. workmen's return fare from the Market Place to Prince Edward Road. The 2d. fare between the Market and Prince Edward Road and between Laygate and The Nook will also be abolished.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

1938

37794. "Electric lamp extractor and replacer." S. G. Beck and London Passenger Transport Board. January 30th, 1940. (536483.)

1939

1336. "Hair drying machines." S. C. Pritchard and Nestlé & Co., Ltd. January 14th, 1939. (Addition to 502245.) (536484.)

6293. "Automatic voltage regulator." A. E. Reed & Co., Ltd., P. W. Cattell and W. E. Hean. February 25th, 1939. (536403.)

7942. "Manufacture of railway and tramway rails." C. P. Sandberg, O. F. A. Sandberg and J. C. W. Humfrey. March 11th, 1939. (Cognate application, 23523/39.) (536401.)

9419. "Radio direction finders." Marconi's Wireless Telegraph Co., Ltd., C. S. Cockerell and G. P. Parker. March 25th, 1939. (536485.)

23326. "Electromagnetically operated electric switches." Birka Regulator C. Appelberg. August 16th, 1938. (536524.)

23396. "Polarisation of light." International Polaroid Corporation. October 4th, 1938. (536490.)

23684. "Radio antennæ." Marconi's Wireless Telegraph Co., Ltd. September 8th, 1938. (536526.)

25291. "Recording instruments." H. R. Cool. September 9th, 1938. (536527.)

26185. "Means for deriving the envelope of an audio-frequency current or the like." Radio Corporation of America. October 29th, 1938. (536410.)

27550. "Electric impulse selecting mechanism." S. Smith & Sons (Motor Accessories), Ltd., and V. J. S. Russell. October 9th, 1939. (536368.)

27623. "Wireless receivers with band spreading." Philips Lamps, Ltd. October 13th, 1938. (536412.)

27836. "Electric dry rectifier." F. Zaccheo and W. A. V. Wilson. October 13th, 1939. (536529.)

27939. "Illuminated writing case." W. Neil. October 15th, 1940. (536530.)

29282. "Electron discharge devices utilizing electron multiplication," H. G. Lubszynski and H. Miller. November 3rd, 1939. (536417.)

29642. "Electric welding processes." Linde Air Products Co. January 6th, 1939. (536420.)

29765. "Secondary ray diaphragms for ray investigation." J. Iten. November 9th, 1939. (536449.)

29769. "Wireless receiving arrangements." Soc. Française Radio-Electrique. November 10th, 1938. (536375.)

29805. "Direction finding systems." Standard Telephones & Cables, Ltd., W. A. Beatty and P. K. Chatterjea. November 10th, 1939. (536377.)

29850. "Helmets." General Electric Co., Ltd., and D. Rogers. November 10th, 1939. (536533.)

29868. "Locating apparatus for use with X-rays." J. O. Rhodes. November 10th, 1939. (536424.)

29880. "Electrically operated sluices and the like." Ransomes & Rapier, Ltd., and M. H. Snell. November 11th, 1939. (536425.)

29886. "Electrical device for determining the distance of thunderstorms." J. S. Forrest. November 11th, 1939. (536427.)

29927. "Frequency modulation systems for radio signalling." British Thomson-Houston Co., Ltd. November 12th, 1938. (536383.)

29949. "Electron discharge valve arrangements." Marconi's Wireless Telegraph Co., Ltd. November 12th, 1938. (536450.)

29951. "Alternating current electric circuit-breakers." A. Reyrolle & Co., Ltd., A. Allan and D. F. Amer. November 13th, 1939. (536451.)

29952. "Alternating current electric circuit-breakers." A. Reyrolle & Co., Ltd., and D. F. Amer. November 13th, 1939. (536452.)

30036. "Time base circuits." Standard Telephones & Cables, Ltd., D. S. B. Shannon and P. K. Chatterjea. November 14th, 1939. (536453.)

30038. "Arrangements for changing over to spare amplifiers or oscillators." Standard Telephones & Cables, Ltd., B. B. Jacobsen and R. A. Martin. November 14th, 1939. (536454.)

30043. "Lighting fittings for A.R.P. lighting." General Electric Co., Ltd., and A. E. Schuil. November 14th, 1939. (536534.)

30162. "Absorption refrigerating apparatus." Electrolux, Ltd. December 14th, 1938. (536384.)

30677. "Electrostatic precipitation apparatus for the removal of suspended particules from gases." Gas Light & Coke Co., E. H. M. Badger and J. Burns. November 24th, 1939. (536429.)

30759. "Thermionic amplifiers." Radio Transmission Equipment, Ltd., and C. E. G. Bailey. November 24th, 1939. (536538.)

31796. "Electric gaseous discharge tubes and methods of manufacture thereof." J. C. Arnold. (Plastic Lights, Inc.) December 8th, 1939. (536385.)

31835. "Electric torches to be carried by the person." H. M. Manuel and G. M. Davidson. December 8th, 1939. (536386.)

32287. "Device for use on temperature regulators such as immersion regulators." Landis & Gyr Akt.-Ges. February 22nd, 1939. (536435.)

32413. "Electromagnetically operated selecting switches." B. Hinks. December 18th, 1939. (Addition to 524015.) (536387.)

32443. "Periodic saw-tooth wave repeaters for television and other purposes." Hazeltine Corporation. January 14th, 1939. (536436.)

33034. "Light control by polarisation." Technicolor Motion Picture Corporation. March 13th, 1939. (536465.)

33099. "Electric welding machines." British Thomson-Houston Co., Ltd. December 31st, 1938. (536439.)

1940

184. "Colour photographic sensitive elements for picture and sound recording." Kodak, Ltd. (Eastman Kodak Co.). January 3rd, 1940. (536466.)

264. "Radio circuits for beat reception." Philips Lamps, Ltd. January 7th, 1939. (536440.)

522. "Liquid compositions for use as heat transfer agents." British Thomson-Houston Co., Ltd. January 10th, 1939. (536442.)

876. "Frost indicating apparatus for refrigerators." British Thomson-Houston Co., Ltd. January 17th, 1939. (536443.)

2767. "Connections between ultra high frequency radio devices." Marconi's Wireless Telegraph Co., Ltd. February 14th, 1939. (536545.)

2899. "Nickel anodes." Mond Nickel Co., Ltd., and W. T. Griffiths. February 15th, 1940. (Addition to 531671.) (536499.)

3463. "Short wave electrical oscillators." Marconi's Wireless Telegraph Co., Ltd., C. S. Cockerell, D. J. Brailsford and M. H. Cufflin. February 23rd, 1940. (536500.)

3978. "Insulators for contact wires of electric traction systems." British Insulated Cables, Ltd., London Passenger Transport Board and J. Holland. March 4th, 1940. (536478.)

4624. "Refrigerating display apparatus." H. Turner. March 12th, 1940. (Addition to 517771.) (536501.)

6323. "Propelling plant for aircraft." British Thomson-Houston Co., Ltd. April 7th, 1939. (536394.)

6325. "Electric sensitive paper." W. G. H. Finch. April 7th, 1939. (536395.)

6717. "Electric switches." British Thomson-Houston Co., Ltd. April 13th, 1939. (536398.)

6759. "Illuminated advertising signs." P. T. Ryan. April 15th, 1940. (536399.)

8338. "Electric induction motor systems." Scophony, Ltd., P. L. F. Jones, D. Waloff and G. Wikkenhauser. May 9th, 1940. (536513.)

8502. "Rotary type switches." Asea Electric, Ltd., and E. W. Dixon. May 10th, 1940. (536402.)

8950. "Electric transformers." British Thomson-Houston Co., Ltd. May 20th, 1939. (536515.)

8952. "Electric valve converting systems." British Thomson-Houston Co., Ltd. May 20th, 1939. (536516.)

9273. "Vacuum pumps." British Thomson-Houston Co., Ltd. May 25th, 1939. (536517.)

9430. "Abrasive tools.' British Thomson-Houston Co., Ltd. May 31st, 1939. (536518.)

9796. "Aerial electric cables." Compagnie Générale d'Electricité. July 11th, 1939. (536519.)

9952. "Method of constructing the surface of a ceiling, wall, or the like, radiating electrically generated warmth." J. L. Musgrave and R. Crittall & Co., Ltd. June 7th, 1940. (536520.)

10751. "Fluid blast electric circuit-breakers." British Thomson-Houston Co., Ltd. June 22nd, 1939. (536557.)

12086. "On-load tap changing systems for transformers." British Thomson-Houston Co., Ltd. July 25th, 1939. (536559.)

Registration in New Zealand

Prosecutions for Infringement

FURTHER prosecutions under the regulations governing the registration of wiremen and the installation of apparatus by unauthorised persons are reported in the *New Zealand Electrical Journal*. In the first case a wireman's registration certificate was endorsed for a series of faults in an installation including conduit not properly saddled; inspection fittings defective; switch left hanging on wires; one conductor of twin flex connected to live terminal of switch, the other conductor being placed under wood screw of outlet flange; single-pole switch mounted upside down; insufficient clearance between wiring and ground; neutral busbar held by one screw only; insulated lampholder installed without "petticoat"; and conduit preventing closing of switchboard panel.

An Auckland salesman was charged with installing electrical conductors and with installing a washing machine otherwise than in the room in which the machine was used and otherwise than by means of a three-pin plug and socket or by means of fixed wiring. He was ordered to pay costs amounting to £1 11s. 0d. The supply authority reported that the machine was installed in a combined washhouse and bathroom; the three-core flexible cord on the machine was connected to a two core flexible conductor by means of a cord connector; the two-core flexible cord was taken across a verandah to a two-pin plug-socket in the kitchen; and the machine was not earthed.

Fines and costs totalling £6 13s. 0d. were imposed upon a Hamilton department store for employing an unregistered person to install electrical conductors and accessories. The supply authority reported that a heavy-duty electric wash-boiler was connected to a three-pin plug-socket by means of 8 ft. of flexible cord which was connected to a three-core cable by means of cord connectors; the neutral conductor and the earthing-lead were transposed at the connection and the conduit carried the return current; and a portion of the current was by-passed through the telephone system generating sufficient heat to burn the rubber insulation off the telephone wires.

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities.

Reports and Dividends

The Ever Ready Co. (Gt. Britain), Ltd.—Presiding at the annual meeting on June 4th, Mr. M. Goodfellow (chairman and managing director) said that it was a matter for congratulation that during a year of rising costs and rising prices to the consumer they had succeeded in maintaining their service and profits without increasing their prices. They had expended considerable sums on capital account during the past three years to ensure the maintenance of production and supply under the conditions existing from September, 1939. Under peacetime conditions a considerable part of this expenditure would immediately lose its value, and they would be entitled to substantial relief from taxation; apart from this relief, their ample reserves enabled them to write off any expenditure on capital account should such expenditure cease to be productive.

The City of Buenos Aires Transport Corporation.—The Buenos Aires correspondent of the *Bank of London & South America Review* states that the gross receipts for last year amounted to 58,424,873 pesos. Operating expenses, including renewals, totalled 71,866,369 pesos, leaving a deficit of 13,441,496 pesos. The report states that this result was due mainly to the fact that all the transport services had not yet been incorporated, but other contributory factors included the higher wartime cost of materials and electric current, and the increase in wages. The number of passengers carried in 1940 was 600,791,866, including 396,095,098 by tramway, 118,804,556 by underground and 85,892,212 by omnibus. Working losses on tramway and omnibus services were 11,821,797 pesos and 4,865,560 pesos respectively, but a profit of 2,939,501 pesos was made on the underground. The report covers the first complete working. At a recent meeting of the Corporation, Admiral M. D. Garcia, announced that a loan of 40 million pesos was being negotiated with Argentine financial houses for the purpose of continuing the expropriation of the omnibus undertakings.

River Plate Electricity and Other Securities Corporation, Ltd.—The net revenue for the year ended April 15th was £29,996, as compared with £36,132 in 1939-40. The final ordinary dividend is 5½ per cent., making 7½ per cent. for the year (against 8 per cent.) The balance carried forward is increased from £10,868 to £13,763. A depreciation of £163,360 in the value of investments is more than counterbalanced by the reserves, showing a surplus of £31,000.

The Keith Blackman Co., Ltd., reports a net profit for the year ended March 31st of £38,414, as compared with £32,770 for 1939–40. The profit is arrived at after writing off £21,564, cost of shelters, A.R.P. equipment, etc., and reserving £52,500 for income tax and N.D.C. It is proposed to pay a dividend for the year of 17½ per cent., less tax (against 15 per cent.).

The London Electric Transport Finance Corporation, Ltd., in its report for 1940 shows that during the year it increased its loans to the London Transport Board, the Great Western and London & North Eastern Railways by £6,293,600 to £35,218,200 out of the authorised £40 millions. There were parallel decreases of £3,174,600 to £607,700 in the Corporation's bank deposits and of £3,121,000 to £1,028,000 in loans to public bodies.

J. Stone & Co., Ltd., report net profits for 1940 of £208,521, as compared with £204,012 for 1939. The ordinary dividend is maintained at 25 per cent., and £251,406 is carried forward (against £231,986 brought in).

The Allgemeine Elektricitäts Gesellschaft, Berlin, reports a gross profit for the year to September 30th, 1940, of Rm. 290,631,500, as compared with Rm. 266,500,000 for the preceding year. The net profit is Rm. 7,654,208 (against Rm. 7,668,355). The dividend for the year is unchanged at 6 per cent.

Guest, Keen & Nettlefolds, Ltd., announce that delays due to the war make it necessary to defer for at least a month the announcement of dividends of which notice is usually given early in June. It is expected that the annual meeting will be convened for a date in the latter part of July.

The Electrolytic Zinc Co., of Australasia is to issue 400,000 ordinary shares of £1 each. They will be offered at par to shareholders in the proportion of 16 new shares for every 104 preference or ordinary now held. The new shares will be offered to shareholders registered on June 20th.

Ruston & Hornsby, Ltd., are paying a dividend of 12½ per cent. on the ordinary stock (less tax) for the year ended March 31st.

Stream-Line Filters, Ltd., report a net profit for the past year of £23,127, as compared with £27,344 for the previous year. The dividend for the year is maintained at 10 per cent. by the final payment of 7 per cent.

Lacrinoid Products, Ltd., report a profit for 1940 of £16,493, as compared with £8,404 for 1939. The final dividend is 4 per cent., making 7 per cent for the year (against 5 per cent.), and £822 is carried forward (against £804 brought in).

Siemens Bros. & Co., Ltd., are maintaining their ordinary dividend for the year at 7½ per cent.

The Pennsylvania Water & Power Co., is paying a quarterly dividend of $1 per share (same).

New Companies

Unit Controls, Ltd.—Private company. Registered May 29th. Capital £1,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical switchboards and control gear, contacts, insulators, dynamos, meters, armatures, batteries, wireless apparatus and equipment, cable, wire, lamps, reflectors and electrical accessories, etc. Subscribers: J. B. Kincross, 6, Bishopsgate, E.C.2, and Miss M. E. Cormor, 62b, Westgate, Peterborough. Solicitors: Theodore Goddard & Co., 10, Serjeants' Inn, E.C.4.

Static Condenser Co., Ltd.—Private company. Registered May 27th. Capital £3,000. Objects: To carry on the business of electricians, electrical and mechanical engineers, manufacturers of electric, magnetic, galvanic and other apparatus, etc. Directors: G. R. Fountain, Cumon, Worham Way, Gomshall, C. D. Gwinn, 161, Reading Road, Wokingham, Berks, J. L. L. North, Wymbleton Cottage, Holmwood, Surrey, and J. A. Wigg, Chesham Villa, Wolsingham Road, Bracknell, Berks. Registered office: Tontley Works, Tontley Road, Wokingham.

Grundys' (Rubber), Ltd.—Private company. Registered May 30th. Capital £2,000. Objects: To carry on the business of manufacturers of, and dealers in, rubber, balata, gutta percha, vulcanite, ebonite and similar substances and goods, electrical, motor and radio engineers, etc. Directors: D. Grundy, 23, Parkfield Road, Northenden, Manchester, and three others. Registered office: Union Bank Buildings, 12a, Piccadilly, Manchester.

Increases of Capital

I. Pearson & Sons, Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £2,000.

Electrical Screw, Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 shares beyond the registered capital of £2,000.

Companies' Returns

Statements of Capital

British N.S.F. Co., Ltd.—Capital £13,500 in 3,000 preference and 9,500 ordinary shares of £1 each and 20,000 deferred shares of 1s. each. Return dated January 14th, 1941. 1,100 preference, 9,500 ordinary and 20,000 deferred shares taken up. £1,183 6s. 8d. paid, being £1 per share on 1,100 preference and 1d. per share on 20,000 deferred. £9,500 considered as paid on the ordinary shares. Mortgages and charges: Nil.

Multitone Electric Co., Ltd.—Capital £20,000 in £1 shares. Return dated January 30th, 1941. 16,750 shares taken up. £11,750 paid. £5,000 considered as paid. Mortgages and charges: Nil.

Zenith Electric Co., Ltd.—Capital £26,250 in 25,000 ordinary shares of £1 each and 25,000 deferred shares of 1s. each. Return dated February 4th, 1941. 25,000 ordinary and 23,334 deferred shares taken up. £5,563 paid on 5,563 ordinary shares. £20,603 14s. considered as paid on 19,437 ordinary and 23,334 deferred. Mortgages and charges: Nil.

Brookhirst Switchgear, Ltd. — Capital £550,000 in £1 shares. Return dated November 22nd, 1940 (filed January 24th, 1941). 126,002 shares taken up. £30,502 paid. £95,500 considered as paid. Mortgages and charges : Nil.

Willans & Robinson, Ltd.—Capital £100 in 100 shares of £1 each. Return dated January 9th, 1941. 2 shares taken up. £2 paid. Mortgages and charges: Nil.

Schall & Son, Ltd.—Capital £20,000 in 9,000 preference and 11,000 ordinary shares of £1 each. Return dated May 30th, 1940 (filed February 13th, 1941). 5,100 preference and 9,102 ordinary shares taken up. £602 paid. £13,600 considered as paid. Mortgages and charges: £17,450.

William Smith (Birstall), Ltd.—Capital £1,000 in £1 shares. Return dated December 31st, 1940 (filed February 10th, 1941). All shares taken up. £200 paid. £800 considered as paid. Mortgages and charges : Nil.

Mortgages and Charges

Siemens-Schuckert (Great Britain), Ltd.—Debenture, charged on properties in Isleworth and Acton, and the company's undertaking and other property, present and future, including uncalled capital, dated May 13th, 1941, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

J. G. Smithson & Co., Ltd.—Mortgage on moneys due or to become due under a contract, dated May 16th, 1941, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £300.

De Renzi Holmes & Co., Ltd.—Satisfaction on March 7th, 1941, of debenture dated September 11th, 1936, and registered September 22nd, 1936. (According to the register of mortgages the debenture registered September 22nd, 1936, originally secured £200.)

Liquidations

G.V.D. Illuminators, Ltd.—Particulars of claims by July 5th to the liquidator, Mr. W. Nicholson, 32a, Weymouth Street, London, W.1.

British Permel Enamelled Wire, Ltd.—Meetings July 10th, under Section 245 of the Companies' Act, 1929, at Victoria Works, Charlton, London, to receive an account of the winding-up by the liquidator, Mr. A. B. Adam.

Bankruptcies

E. E. Garfield, electrician, 49, Ormond Street, Aston, Birmingham.—Trustee, Mr. R. K. Clark, 37, Temple Street, Birmingham, Official Receiver, released May 29th.

H. A. Smith, electrical engineer and contractor and neon sign engineer, 76, Canterbury Street, Gillingham.—Trustee, Mr. F. C. Wells, 280A, High Street, Rochester, Official Receiver, released May 28th.

H. J. Gill, electrical engineer and radio dealer, 10, High Street, Keynsham, Somerset. —First and final dividend of 3s. 1d. in the £, payable June 21st at 26, Baldwin Street, Bristol.

STOCKS AND SHARES

TUESDAY EVENING.

THE course of war events in the Middle East has not been calculated to inspire such measure of cheerfulness as might be expected to lead money into Stock Exchange markets; but, in spite of this, prices hold their previous ground with notable steadiness. It is true that business in most of the markets has contracted. Enterprise prefers to wait upon the next developments, whatever they may prove to be, before venturing into new commitments. The market for British Government securities has shown indications of quietening down after having been the most popular centre of attraction for the greater part of the present year. Quotations have given way to a minor extent, but this has not affected gilt-edged securities such as those connected with public boards, Home Railway prior-charge stocks and debenture issues. Among industrial features, Siemens shares stand out with a rise on the dividend for the year being again 7½ per cent. The Cable and Wireless market keeps very firm, with the preference at 100. The ordinary stock has changed hands up to 67¼.

Home Railway Hiatus

Like a good many other markets round the Stock Exchange, the Home Railway department has more or less marked time as a result of the kaleidoscopic developments in the Middle East. The Government's War Damage Bill having been published, the path is thereby rendered clearer for bringing forward details of the new agreement between the Government and the railway companies. What the terms are going to be is a matter of guesswork; the steadiness of market quotations for the stocks hints plainly that no alteration is expected in that portion of the Government's guarantee which affects the dividends paid during the war period. The senior stocks hold their high estate. The junior issues, while more susceptible to the mood of the moment, are a little easier. London Passenger Transport "C" stock is a point lower at 30. Southern preferred remains at 50½. Metropolitan assented is higher at 49. With this month, there finishes the first half of the railway companies' year. Anticipation looks for repetition of the same dividends as those declared for the corresponding half of 1940.

Electricity Supply Yields

So great is the urge shown by money for investment into front-rank industrial shares, that the yields on these latter are becoming exceedingly slender when allowance is made for a 10s. income tax. Reference to our price lists will show that Yorkshire Electric ordinary, for instance, pay barely 4¼ per cent.; Scottish Power, a little under 4½ per cent.; Midland Counties £4 11s. 5d. per cent. This, moreover, is calculating the return, on the basis of the last-paid dividend, at to-day's middle prices; in the majority of cases, the buyer would have to pay more than these, even if he were able to get the offer of shares at all. Such high prices and low yields might be supposed to act as a restraint upon demand, but in point of fact the reverse is the case: there are more buyers than sellers in the market.

County of London, however, remain on offer at 31s., to pay £5 3s. 3d., and Electric Supply Ordinary are still available at 39s., to yield £5 2s. 6d. per cent. Shares in certain other companies can be bought to give a better return. As indicated last week, 1,000 Richmond (Surrey) Electric Light & Power ordinary are obtainable at a guinea, to yield £5 14s. 3d., and 2,000 Southern Areas, offered at 17s. 6d., return the same income. The prices mentioned in these two paragraphs are higher than those quoted in our lists, and although the shares would probably be obtained more cheaply than the quotations just given, the buyer would still have to pay well above the middle prices given opposite. In working out the yield on these various shares, the last-paid dividend for the full year is, of course, taken as the basis for calculation. Dividends on ordinary shares are liable to variation, as everybody knows from experience which, nowadays, is not invariably pleasant. The supply of preference shares lags behind the demand for them, with the result that few of the preference shares in the front-rank companies pay more than 4 per cent. on the money.

Llanelly Electric

The new issues of ordinary and preference shares of the Llanelly Electric Company are being dealt in separately, although original subscribers had to take the two shares—ordinary and preference—in one unit at 43s. The new ordinary shares are now 10s. paid and the preference 13s. paid; the respective prices being 9s. 6d. and 16s. So far, therefore, the subscribers can see a modest profit on their purchase. It may be assumed that when the new shares settle down in permanent hands, the prices will rise.

Price Fluctuations

Electric Finance and Securities shares have advanced to 41s. 3d., the highest price so far reached during the present year. A few Clyde Valley shares came in for sale, and the price eased off to 34s. 6d. London Associated Electrics have gone back to 15s., showing at that price a return of 6 per cent. on the last-paid dividend of 4½ per cent. Johnson & Phillips at 46s. 3d. are $\frac{1}{16}$ harder. Associated Electrical Industries ordinary have been a good spot, rising a florin to 42s. Revo 10s. shares have resumed an advance which has raised the price to 22s. 6d. A mild degree of speculation in Electric & Musical Industries put up the price to 10s., from which it subsequently reacted to 9s. 3d., at which a gain of 3d. remains on the week. British Electric Traction deferred stock holds its rise at 775. The National Electric Construction Co., a subsidiary of B.E.T., has declared a first and final dividend of 10 per cent.—the same as that of a year ago.

Ever Ready

Post-war plans are being laid in advance by companies which are bound to be affected by a change-over to peace conditions when these arrive. The Ever Ready Company, to take a prominent example, has spent, as the chairman pointed out at the recent meeting, considerable sums on capital account to ensure the power of production and supply under the conditions existing from September, 1939. A large part of this expenditure will immediately lose its value under peacetime conditions. "We should be entitled," said he, "to substantial relief from taxation; apart from this relief, our ample reserves enable us to write off any expenditure on capital account should such expenditure cease to be productive." The Ever Ready Company has lent £100,000 to the Government free of interest, and has also given a "Spitfire," to which all the company's people subscribed, together with a donation to the R.A.F. Benevolent Fund. It must be conceded that in its multifarious activities, the company lives up to its title. The ordinary shares are rather better at 27s. 3d.

Siemens Dividend

By announcement of 7½ per cent. dividend on the ordinary shares, Siemens have fulfilled the expectation that this rate, paid annually for the past four years, would be repeated. In advance of the declaration, a lurking doubt had been expressed as to whether the claims of taxation might cause a reduction. As soon as the statement came through, the price rose a florin, to 22s., from which it reacted a trifle. The company pays its ordinary dividend only once a year; the present 7½ per cent. is equal to 9d. per share net. On the yield afforded by 7½ per cent. dividend, the shares can hardly be regarded as expensive at 21s. 3d. ex dividend. At 25s. the return would be 6 per cent. on the money and, by comparison with shares in other companies engaged in similar work, the shares look reasonably valued at 1¼.

Preference and Premiums

Probably Siemens 10 per cent. £1 preference would be standing higher than 36s. 3d. were it not for the premium of 16s. 3d. that they command. Investment recovered long ago from its spasm of apprehension lest preference, and other fixed-interest shares that stood at high premiums, might have to face the possibility of redemption at the par value. For some time past, nobody has paid any real heed to this fear, but the very vagueness of it lent menace in bygone days to the off-chance of such a thing happening. Investors still prefer to put money into a fixed-interest share, the price of which stands fairly near to par; and, for this reason, some of the lower-dividend preference shares are quoted at prices which look relatively high against those of shares upon which the rate of dividend is greater, and whose prices are at a good premium above their par value. Slight as is the possibility of the latter shares being repaid at par, investment often, as the prices show, prefers to put safety first, though it may mean acceptance of a little less income.

River Plate Electric

The River Plate Electricity and Other Securities Corporation has declared a dividend of 7½ per cent. on the ordinary shares, against 8 per cent. a year ago. According to the report, the valuation of investments on April 15th last showed depreciation of £163,360 on book cost, but with the capital reserve and carry forward there is still a surplus of £31,000 over and above the capital. The price of the 10s. ordinary shares is 9s. 6d. By the articles of association no more than 5 per cent. of the issued share and debenture capital may be invested in any one company, and not more than 2½ per cent. in any one security, except securities in the United Kingdom or the British Government.

Stop Press Prices

The scarcity of paper supplies has been responsible, as observed on a previous occasion, for a severe restriction in the number of prices officially quoted in the Stock Exchange Daily Lists. Several scores of prices were removed, these relating to shares in which there is not, as a rule, any active interest. What transactions occur in them are marked in what is called "Stop Press Prices," and amongst these there figure a number connected with electricity undertakings. To give a few instances of recent transactions, there have changed hands: Delhi Electric at 32s.; Mexican Light & Power Common at $\frac{1}{8}$; Perak River preference at 20s. 6d.; Telephone Props. preference at 24s. 3d.; Pye 8 per cent. preferred at 21s.; and Cawnpore Electric 4½ per cent. debentures at 99½.

As a matter of curiosity it may be added that Mexico Tramways common shares changed hands lately at one-sixteenth of a dollar.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price June 9	Rise or Fall	Yield £ s. d. p.c.
Home Electricity Companies							
Bournemouth and Poole	48/6	45/–	15	12½	46/3	..	5 8 3
British Power and Light	27/9	23/–	7	6	24/6	..	4 18 0
City of London	22/6	20/–	7½	7	21/3	..	6 11 9
Clyde Valley	36/6	33/6	8	8	34/6	–6d.	4 12 9
County of London	34/6	30/–	10½	8	30/–	..	5 6 8
Edmundson's:							
7% Pref.	31/–	25/6	7	7	30/9	..	4 11 1
Ord.	26/–	23/6	6	6	26/–	..	4 12 4
Elec. Dis. Yorkshire	39/–	36/–	9	9	38/9	..	4 12 9
Elec. Fin. and Securities	41/6	39/–	12½	12½	41/3	+⅛	6 1 2
Elec. Supply Corporation	39/–	36/–	11½	10	39/–	..	5 2 6
Isle of Thanet	8/–	6/–	2	Nil	7/6	..	—
Lancs Light and Power	31/6	28/6	7½	7½	31/3	..	4 16 0
Llanelly Elec.	21/–	19/6	5½	5½	20/–	..	5 10 0
Lond. Assoc. Electric	16/6	12/6	5½	4½	15/–	–9d.	6 0 0
London Electric	23/6	21/3	7	7	22/6	..	6 4 5
London Power Deb. Red	105½	102	5	5	103	..	4 17 1
Metropolitan	34/6	31/–	10	8	31/3	..	5 2 3
Midland Counties	35/6	32/9	8	8	35/–	..	4 11 5
Mid. Elec. Power	35/–	33/3	9	9	35/–	..	5 2 10
Newcastle Elec.	26/3	24/6	7	7	25/–	..	5 12 0
North Eastern Elec.:							
Ordinary	29/–	25/6	7	7	27/6	..	5 1 10
7% Pref.	32/6	29/–	7	7	32/6	..	4 6 2
Northampton	2⅛	39/6	10	10	41/3	..	4 17 0
Notting Hill 6% Pref.(£10)	9	8	6	6	8½	..	—
Northmet Power:							
Ordinary	34/6	28/6	10	7	28/9	..	4 17 4
6% Pref.	29/6	27/3	6	6	29/6	..	4 1 4
Richmond Elec.	20/–	18/–	6	6	18/9	..	6 8 0
Scottish Power	36/6	33/–	8	8	36/3	..	4 8 5
Southern Areas	16/6	14/6	5	5	16/3	..	6 3 0
South London	20/–	19/3	7	7	20/–	..	7 0 0
West Devon	21/6	20/9	5	5	21/3	..	4 14 1
West Glos.	18/3	17/3	4½	4½	17/6	..	5 2 10
Yorkshire Elec.	38/3	34/6	8	8	38/3	..	4 4 0
Overseas Electricity Companies							
Atlas Elec.	2/6	1/6	Nil	Nil	2/–	..	—
Calcutta Elec.	37/3	33/–	8*	7*	35/6	–6d.	3 19 0
Cawnpore Elec.	30/–	26/–	10	10	28/9	..	7 5 9
East African Power	25/6	21/6	7	7	25/–	..	5 12 0
Jerusalem Elec.	22/6	18/6	7	7	18/9	..	7 9 4
Kalgoorlie (10/–)	12/6	11/–	7½	7½	12/6	..	6 0 0
Madras Elec.	25/3	23/6	8*	6*	23/9	..	—
Montreal Power	31	24	1½	1½	24	–1	6 5 0
Palestine Elec. "A"	20/6	15/–	Nil	Nil	16/3	..	—
Perak Hydro-electric	18/3	16/3	2½	6	16/3	..	7 7 8
Shawinigan Power	18½	14	83cts.	90cts.	14	–1	—
Tokyo Elec. 6%	40½	36	6	6	36½	..	16 9 0
Victoria Falls Power	76/6	69/6	15	15	73/9	..	4 1 4
Whitehall Investment Pref.	14/9	8/3	7½	7½	10/–	..	15 0 0
Public Boards							
Central Electricity:							
1950–70	110½	108	5	5	110½	..	4 10 6
1955–75	113½	109½	5	5	113	..	4 8 6
1951–73	108	105½	4½	4½	107xd	..	4 4 1
1963–93	101	94	3½	3½	100	..	3 10 0
1974–94	94	87½	3½	3½	94	..	3 9 2
London Elec. Trans. Ltd.	94	91½	2½	2½	94	..	2 13 2
London & Home Counties							
1955–75	108	106	4½	4½	108	..	4 3 4
Lond. Passenger Transport:							
A	120	109	4½	4½	116½xd	..	3 17 3
B	114	102½	5	5	111½xd	..	4 9 8
C	36	29	1½	3	30	–1	10 0 0
West Midlands Joint Elec.							
1948–68	108½	103	5	5	108½	+1	4 12 0
Telegraph and Telephone							
Anglo-Am. Tel:							
Pref.	103½	99	6	6	103½	..	5 16 1
Def.	24	21	1½	1½	22½	..	6 13 4
Anglo-Portuguese	17/6	12/6	8	8	12/6	..	12 16 0
Cable & Wireless:							
5½% Pref.	102	93	4½	5½	100	..	5 10 0
Ord.	68	52½	4	4	67	+1	5 19 5
Canadian Marconi $1	5/–	4/–	Nil	4cts.	5/–	..	3 4 0
Globe Tel. & Tel.:							
Ord.	29/–	26/–	7½*	6*	27/6	..	4 7 3
Pref.	27/6	25/–	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	14	10½	20	20	12½	..	—
Inter. Tel. & Tel.	3½	2½	Nil	Nil	3	..	—
Marconi-Marine	23/–	19/9	7½	7½	23/9	..	6 6 4
Oriental Telephone Ord.	55/6	47/–	12*	11½*	2⅛	..	4 1 10
Telephone Props.	11/6	11/–	6	6	11/3	..	10 13 4
Telephone Rental (5/–)	7/9	6/9	10	10	7/3	..	6 18 0

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price June 9	Rise or Fall	Yield £ s. d. p.c.
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	2/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	8½	4	Nil	Nil	4½	..	—
British Electric Traction:							
Def. Ord.	830	740	45	45	775	..	5 16 2
Pref. Ord.	167	150	8	8	160	..	5 0 0
Bristol Trams	40/–	36/–	8*	8	36/3	..	4 8 5
Brazil Traction	8	6½	$1	50c.	7	..	—
Calcutta Trams	19/9	18/–	8	5½	18/–	..	6 2 3
Cape Elec. Trams	17/6	16/6	5	5	17/–	..	5 17 4
Lancs Transport	39/9	36/–	10	10	38/9	..	5 3 1
Mexican Light:							
1st Bonds	40	34½	5	5	40	..	—
Rio 5% Bonds	85½	82½	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	53½	43½	5	5	50½	..	9 18 0
5% Pref.	94	77½	5	5	93½	..	5 7 0
T. Tilling	43/6	34/6	10	10	42/6	..	4 14 0
Tilling & B.A.	48/–	45/6	8*	7*	45/9	..	3 1 2
West Riding	36/–	34/–	10	10	36/–	..	5 11 1
Equipment and Manufacturing							
Aron Electricity Ord.	18/6	16/–	15	Nil	17/6	—	—
Assoc. Elec.:							
Ord.	42/–	38/3	10	10	42/–	+2/–	4 15 3
Pref.	36/–	33/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	41/3	..	6 1 1
Babcock & Wilcox	43/3	39/–	10	11	40/9	+6d.	5 7 8
British Aluminium	43/6	39/–	12½	10	40/9	..	4 18 1
British Insulated Ord.	88/3	78/9	20	20	82/6	..	4 17 0
British Thermostat (5/–)	12/6	10/6	18½	18½	12/6	..	7 8 0
British Vacuum Cleaner(5/–	6/3	6/–	40	12½	6/3	..	10 0 0
Brush Ord.	4/3	3/6	Nil	Nil	4/–	..	—
Callender's	65/6	58/6	15	15	61/3	..	4 17 9
Chloride Elec. Storage	63/6	60/–	15	15	62/6	..	4 15 10
Consolidated Signal	65/–	60/–	17	17	62/6	..	5 8 7
Crabtree (10/–)	24/–	21/3	17½	17½	23/9	..	7 7 4
Crompton Parkinson:							
Ord. (5/–)	19/–	17/9	30	20	18/9	..	5 6 8
E. K. Cole (5/–)	4/9	2/9	10	Nil	4/6	..	—
Elec. & Musical Industries							
(10/–)	10/–	7/3	5	Nil	9/3	+3d.	—
Electric Construction	27/6	25/–	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	51/–	45/–	16½	12½	45/–	..	5 11 3
Electrical Switchgear (10/-)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	31/6	29/–	10	10	31/3	..	6 8 0
Ensign Lamps (5/–)	16/3	15/–	25	25	15/–	..	8 6 3
Ericsson Tel. (5/–)	37/3	35/–	25*	22*	35/–	..	3 2 10
Ever Ready (5/–)	27/6	25/–	40	40	27/3	+3d.	7 7 0
Falk Stadelmann	16/9	13/9	6	7	15/9	..	8 17 10
Ferranti Pref.	25/6	23/6	7	7	25/–	..	5 12 0
G.E.C.							
Pref.	33/–	30/6	6½	6½	32/6	..	4 0 0
Ord.	83/–	77/–	20	20	82/6	..	4 17 0
Greenwood & Batley	21/–	18/6	15	13	20/–	..	13 0 0
Hall Telephone (10/–)	14/–	10/–	15	10	13/9	..	7 5 6
Henley's (5/–)	21/6	19/6	20	20	20/–	..	5 0 0
4½% Pref.	21/6	20/–	4½	4½	21/3	..	4 4 8
Hopkinsons	43/–	37/6	15	15	42/6	..	7 1 2
India-Rubber Pref.	21/6	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	92/6	81/3	32½	30	92/6	..	6 13 4
J. Lucas	59/–	50/6	15	15	58/9	..	5 2 0
Johnson & Phillips	48/3	43/–	15	15	46/3	+⅛	6 9 10
Lancashire Dynamo	53/6	50/–	20	20	52/6	..	7 12 5
Laurence, Scott (5/–)	10/–	7/6	15	15	9/3	..	8 2 2
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	40/–	32/–	13½	10	40/–	..	5 0 0
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	84/6	75/–	20	20	82/6	..	4 7 0
Pye Deferred (5/–)	11/6	10/9	25	25	11/3	..	11 2 2
Revo (10/–)	22/6	18/9	17½	5	22/6	+⅛	2 4 6
Reyrolle	52/6	47/9	12½	12½	52/6	..	4 15 6
Siemens Ord.	22/9	17/–	7½	7	21/3	+⅛	7 1 2
Strand Elec. (5/–)	2/–	1/–	4	2	2/–	..	5 0 0
S. Smith (1/–)	7/9	5/9	37½	50	6/3	..	8 0 0
Switchgear & Cowans (5/–)	9/–	7/3	10	15	8/9	..	8 11 6
Telegraph Condenser (10/–)	12/6	7/–	Nil	5	12/6	..	4 0 0
Telegraph Construction	40/–	34/6	10	10	40/–	..	5 0 0
Telephone Mfg. (5/–)	7/6	6/9	9	9	7/3	..	6 4 2
Tube Investments	92/6	89/–	23½	23½	90/–	..	5 5 6
Vactric (5/–)	2/3	2/–	4	Nil	2/–	..	—
Vickers (10/–)	16/–	14/–	10	10	15/3	..	6 11 4
Ward & Goldstone (5/–)	19/9	12/6	20	20	16/6	..	5 19 9
Westinghouse Brake	42/6	39/6	17½	10	40/9	..	4 18 1
Walsall Conduits (4/–)	26/6	24/6	55	55	26/3	..	8 7 6
West Allen (5/–)	4/3	3/6	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work.

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Birmingham.—June 25th. Electric Supply Department. Motor-driven air compressor, etc., for the Hams Hall "B" power station. (June 6th.)

Burnley.—June 16th. Electricity Department. Duplicate busbar compound filled e.h.v. switchgear and e.h.v. cables. (June 6th.)

Dundee.—June 16th. Corporation Public Health Committee. Various works, including emergency electric light installation in shelters. Particulars from the City Quantity Surveyor, 21 City Square.

Exeter.—June 26th. Electricity Department. Indoor transformers. (See this issue).

Hastings.—June 18th. Corporation. Boiler fuel for the period July 1st, 1941, to June 30th, 1942. (May 30th.)

South Africa.—DURBAN.—City Council. June 20th. Lightning arrestors, pole fuses, l.v. insulators, enamelled shades and sodium vapour lamps. Battery charging plant and electrical test bench.

July 4th. Five 15-kVA transformers.

PORT ELIZABETH.—City Council. July 24th. Cable, copper wire and house service cut-outs.

South Kesteven.—Rural District Council. Electrical installation at the Isolation Hospital at Bourne.

Welwyn Garden City.—June 20th. Urban Waterworks Department. Two 18in. diameter boreholes, with temporary pumping plant for testing the yield. Particulars from W. E. James, waterworks engineer, Council Offices, Bridge Road.

Weymouth & Melcombe Regis.—June 23rd. Electricity Department. 11-kV overhead line, underground cables and switchgear. (June 6th.)

Orders Placed

Australia.—BRISBANE.—City Council. Accepted. 2,850-kVA bank of metalclad reactors (B.T.H.), £2,273; 11,000-V switchgear for interconnector between New Farm and Bulimba power stations (B.T.H.), £1,535; traction motors for tramway department.—Australian General Electric Pty., Ltd. Four outdoor-type automatic feeder voltage regulators.—Crompton Parkinson (Aust.) Pty., Ltd. Four-motor control equipments (12 sets, total price, £3,795).—Siemens (Aust.) Pty., Ltd.

Department of Supply and Development. Busbar distribution systems.—Ford Mfg. Co. of Aust., Ltd. (£2,712); H. Rowe & Co. Pty., Ltd. (£3,980); Siemens (Aust.) Pty., Ltd. (£712).

Birmingham.—Electricity Committee. Accepted during the period from January 25th to May 16th. Air cooler section for turbo-alternators.—C. A. Parsons & Co. Two motor generator sets, extension switchgear and reactors "B" power station.—G.E.C. Metalclad switchgear.—George Ellison.

Blackburn.—Town Council. Accepted. Single core 6.6-kV cable.—Edison Swan Cables. V.i.r. insulated multicore cables.—Liverpool Cable Works. 13-panel metalclad distributor board.—A. Reyrolle & Co.

Subject to the approval of the Electricity Commissioners, the tender of Simon Carves, Ltd., has been accepted for the supply and erection of ash-handling plant.

Cardiff.—Electricity Committee. Accepted. Two sets of auxiliary control gear (£298 each).—Metropolitan Vickers Electrical Co.

Cheltenham.—Electricity Committee. Contracts renewed for 12 months. E.h.v. cables.—Hackbridge Cable Co. L.v. cables.—Aberdare Cables.

London.—Joint Electricity Authority. Renewal of annual contract for a further twelve months on existing terms and conditions.—Drake & Gorham (Wholesale), Ltd.

Manchester.—Parks Committee. Accepted. Alternative power supply to glasshouses in Wythenshawe Park.—Metropolitan Vickers Electrical Co.

Electricity Committee. Accepted. Switchgear.—Ferguson, Pailin; A. Reyrolle & Co. Feed and circulating-water pumps.—Mather & Platt. Sub-contractors for turbine reducing gears.—Turbine Gears. Circulating-water valves.—J. Blakeborough & Sons. Fire-extinguishing equipment. — Walter Kidde Co.; Mather & Platt; Atlas Sprinkler Co. Sub-contractors for power station work: Lagging for h.p. pipework for boilers.—Wm. Kenyon & Sons. Steam traps for steel valves and traps for h.p. steam and water.—Hopkinsons. Boiler plant: Draught plant.—Jas. Howden & Co. (Land). Soot blowers.—Clyde Blowers. Automatic boiler control.—Jas. Gordon & Co. Vacuum cleaning plant.—British Vacuum Cleaner & Engineering Co. Economisers.—E. Green & Son. Coal weighers.—Henry Simon. Motors.—Lancashire Dynamo & Crypto. Valves, etc.—Hopkinsons.

Corporation Central Purchasing Committee. Accepted. Electric lamps.—Brown Bros.; Baxendale & Co.; Berry's Electric; R. H. Dent; Downes & Davies; Drake & Gorham Wholesale; Electrical Components; Falk Stadelmann & Co.; Samuel Gratrix; Hirst, Ibbotson & Taylor; Hobday Bros.; F. Hulme & Co.; R. Johnson, Clapham, & Morris; Sloan Electrical Co.; Stearn Electric Co.; Albert Taylor (Manchester); Underwood (Electric); Walsall Conduits; J. C. White & Co.; Wholesale Fittings Co.; Z. Electric Lamp & Supplies Co.; E. Hammond & Co.; H. Akroyd; Thorn Electrical Industries; and Ensign Lamps.

Sheffield.—Electricity Committee. Accepted. Completion of installation of coal-handling plant (£25,786).—Mitchell Engineering. Copper condenser tubes (£4,633).—Yorkshire Copper Works.

Transport Committee. Contracts extended for 12 months. Lamps.—J. Riley & Sons. Lamps and cable.—R. Neill & Co. (Sheffield). Armature coils, commutators and copper rings.—P. R. Jackson & Co. Copper tips.—H. Peace.

Scarborough.—Town Council. Accepted. Substation additions (£170).—E. Hunter.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Five communal feeding centres, for T.C.; city architect, Town House.

Ancoats.—Extensions to works; David Walton, Ltd., builders, Clarendon Road, Salford.

Atherton.—Conversion of building, Market Street, as communal restaurant, for U.D.C.; A. J. Kedward, clerk, Town Hall.

Bangor (N. Wales).—Reinstatement of 12 condemned houses for T.C.; B. Price Davies, borough surveyor, Town Hall.

Bedford.—Renovation works at Mogger-hanger Park Sanatorium, for C.C.; County Architectural Department, Shire Hall.

Bolton.—Boiler house and joiners' shop; Knowles, Ltd., Turton Street.

Boiler house, Bazley Street; Smithhills Laundry, Ltd.

Botley (Hants.).—Hostel for Women's Land Army; Botley and Bishop's Waltham Farmers' Union.

Bournemouth.—Three restaurants; borough engineer.

Brighouse.—Communal feeding centre at the Hipperholme and Lightcliffe Liberal Club premises, Wakefield Road, Hipperholme, for T.C.; H. A. Sneezum, borough surveyor, Municipal Offices, Commercial Street.

Carlisle.—Alterations to police station, Abbey Street, for Cumberland C.C.; J. H. Haughan, county architect, 4, Alfred Street North, Carlisle.

Carmarthen.—Temporary buildings for extension of the County Isolation Hospital, for C.C.; W. V. Morgan, county architect, County Offices.

Cheltenham. — Partial rebuilding King's Arms Inn, Bath Road; Stroud Brewery Co., Ltd.

Chichester.—Repairs West Sussex Court House (£3,500); county architect.

Collyhurst.—Additions to works; W. Gornall & Sons, Ltd., builders, Gore Street, Salford, 3.

Coseley.—School canteen at Mount Pleasant Council School for E.C.; G. Mitchell, surveyor, Council House.

Glasgow.—Workshop, Mansion Street; A. & J. Main & Co., Ltd.

Watford.—Canteen, Lower High Street; Ever Ready Battery Co., Ltd.

Alterations, Shrodells institution; Herts. county architect.

West Boldon (Co. Durham).—Alterations at Black Horse Inn; Isaac Tucker & Co., Ltd., brewers, Turk's Head Brewery, Gateshead.

Wigan.—Installation of electric lighting, St. Patrick's R.C. Schools, for E.C.; director of education, Education Offices, Town Hall,

Wood Green.—Store, Cline Road; R. W. Munroe, Ltd.

York.—Eight feeding centres; city engineer.

Independent Operation at Liverpool

A REPORT has been submitted by Mr. P. J. Robinson, city electrical engineer, Liverpool, to the Electric Power & Lighting Committee, with regard to the final costs of independent operation for the years 1934-1936. In this, he states that as far back as 1927, he recommended 40,000 kW units for Clarence Dock station and was guided by reasons of technical efficiency, growth of load and capital costs. Variation in cost is not *pro rata* to size. It was not possible to purchase two 25,000 kW sets for the same price as one 50,000 kW set, and buildings and site would cost considerably more for the same plant capacity. Mr. Robinson does not consider the amount of reserve plant to be excessive for the undertaking's requirements, always remembering that plant extensions must be planned two years ahead of the required date of operation. Under independent operation and sound engineering practice, a reserve of plant equivalent to the largest generator must be maintained.

Replying to the observation by Councillor Sloan that the undertaking was not in the position it was meant to be under independent operation, Mr. Robinson concludes that on the contrary, the Corporation and the city had gained considerably from (1) increased rateable value, (2) provision of employment in construction and operation, (3) in the reliability and efficiency of the supply given by the undertaking, (4) in the tariff reduction given to consumers by reason of the increased output and decreased cost of production, and (5) both the Liverpool generating stations, unlike those of similar large undertakings, are built within the actual rateable area of the authority owning them.

The Electric Power and Lighting Committee recommends that the final costs of independent operation be agreed with the Central Electricity Board as follows:—1934, £626,836; 1935, £627,025; and 1936, £708,941.